

# **SUMMARY OF RESEARCH 1996**

**Department of Systems  
Management**

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**NAVAL POSTGRADUATE SCHOOL**  
**Monterey, California**

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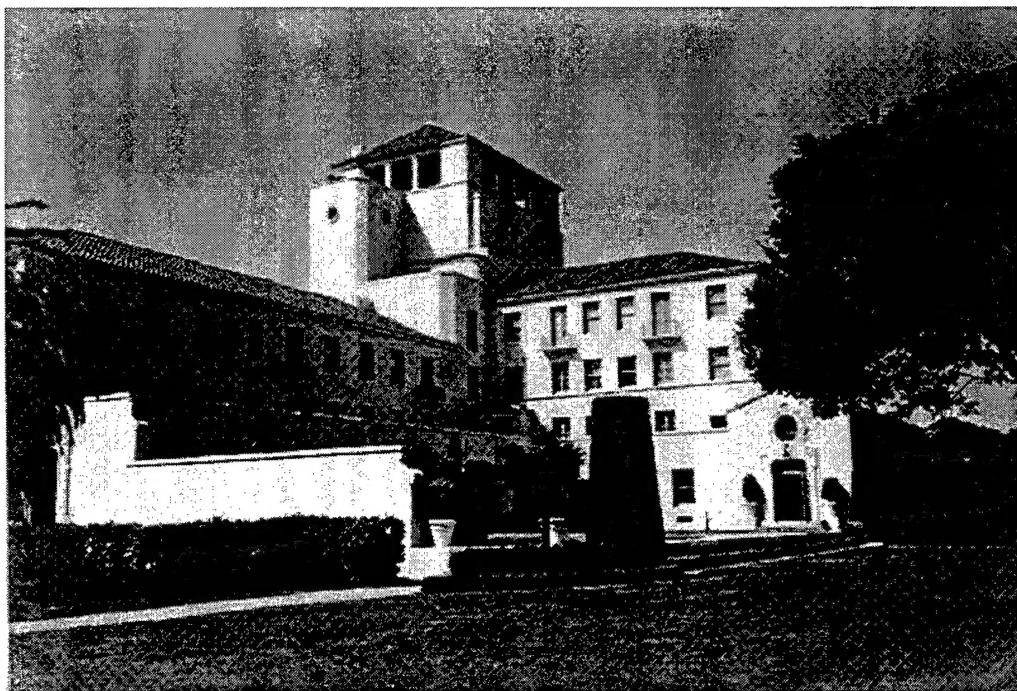
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**DEPARTMENT  
OF  
SYSTEMS MANAGEMENT**

**REUBEN T. HARRIS  
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## **THE NAVAL POSTGRADUATE SCHOOL MISSION**

The mission of the Naval Postgraduate School is to increase the combat effectiveness of US and Allied armed forces and enhance the security of the USA through advanced education and research programs focused on the technical, analytical, and managerial tools needed to confront defense-related challenges.



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## Preface

Research is an integral part of graduate education. At the Naval Postgraduate School (NPS), the goals of research are to:

- Provide a meaningful, high quality, capstone learning experience for our students.
- Keep faculty on the leading edge of advances in defense-related science, technology, management and policy to ensure that the latest information is incorporated into NPS courses and curricula.
- Apply faculty and student knowledge to enhance DoN/DoD operational effectiveness.

Pursuit of these goals increases the technical and managerial capability of the officer corps to keep pace with an increasingly complex defense posture in today's world.

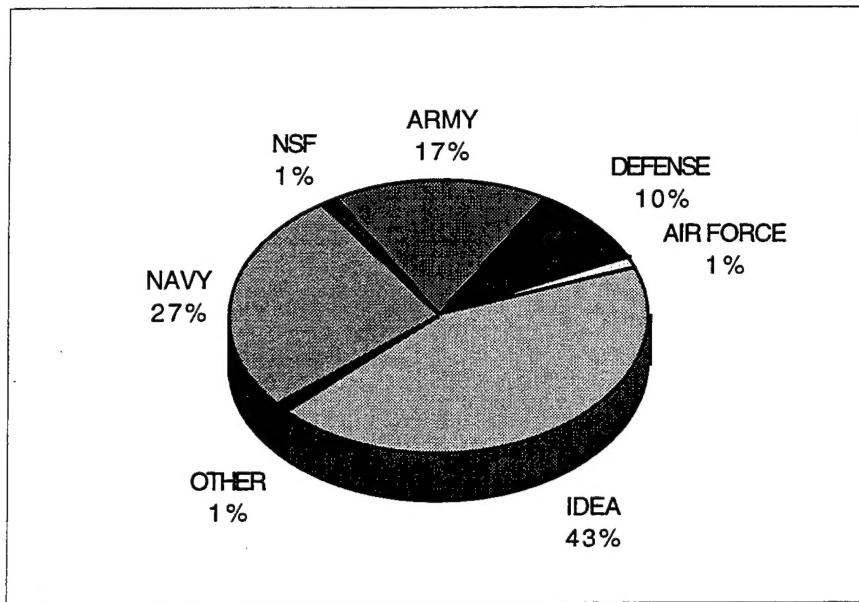
New technologies and policy changes will of course occur, necessitating changes in educational programs and stronger ties between the fleet and the support establishment. NPS must remain poised to face this challenge and to utilize emerging technologies and new policies within its curricula programs. Faculty, therefore, must stay abreast of these developments through a dynamic research program that helps fulfill the School's goals of excellence, uniqueness, and relevance.

The overall research program at NPS has three funded components. The Direct Funded Research and Institute for Joint Warfare Analysis Programs are institutionally funded within the School's operating budget. The Direct Funded Research Program is administered by the Associate Provost and Dean of Research. The Institute for Joint Warfare Analysis Program is administered by the Director of IJWA.

- The Direct Funded Research (DFR) Program provides funding to stimulate innovative research ideas of benefit to the DoN and may be used for cost-sharing with reimbursable research efforts. This funding ensures, in particular, that all Navy-sponsored NPS curricula are equitably supported, that new faculty are provided an opportunity to establish a research program of importance to DoN/DoD and other national security interests, and that faculty and students from across the campus are encouraged to interact with one another.
- The Institute for Joint Warfare Analysis Research Program provides funding to stimulate innovative research ideas with a strong emphasis on joint, interdisciplinary areas. This funding ensures that joint relevance is a consideration of faculty research.
- The Reimbursable Research (RR) Program includes those projects externally funded on the basis of proposals submitted to outside sponsors by the School's faculty. These funds allow the faculty to interact closely with RDT&E program managers and high-level policy makers throughout the Navy, DoD, and other government agencies as well as with the private sector in defense-related technologies. This ensures that NPS research remains highly regarded by academic peers and government officials and fosters a closer relationship between NPS and other outside organizations.

The three research programs are complementary and ensure that the overall research program is flexible, responsive, balanced and supportive of the unique needs of the military.

In 1996, the level of the research effort at the Naval Postgraduate School was 141 faculty workyears and exceeded 29 million dollars. Eighty percent of the research was funded by reimbursable sponsors and 20 percent was funded by the Naval Postgraduate School. Sixty-five percent of the work was performed for the Navy and the remainder was sponsored by other agencies, both DoD and non-DoD. A profile of the reimbursable program of the Department of Systems Management is provided in Figure 1:



Size of Program: \$3,749K

Figure 1. Department of Systems Management - Sponsor Profile

Research at NPS is carried out by faculty in the School's eleven Academic Departments, four Interdisciplinary Groups and the School of Aviation Safety. In the pages that follow, research summaries are provided for projects undertaken by faculty in the Department of Systems Management during 1996. An overview and faculty listing are provided as an introduction. A list of publications is also included, if applicable. Abstracts for thesis advised by department faculty in 1996 complete this research summary.

Questions about particular projects may be directed to the Faculty Principal Investigator listed, the Department/Group Chair, or the Department Associate Chair for Research. Questions may also be directed to the Research Office. General questions about the NPS Research Program should be directed to the Research Office at (408) 656-2098 (voice) or [research@nps.navy.mil](mailto:research@nps.navy.mil) (e-mail).

August 1997

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## DEPARTMENT SUMMARY

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Systems Management is the largest academic department at the Naval Postgraduate School (NPS), with approximately 80 full-time faculty and 30 support staff. The department's mission is to "improve the managerial capabilities and leadership qualities of Naval and other officers, as well as government executives, through graduate education, research, and professional service"; further, Systems Management strives to "conduct a variety of research that supports military decision making, problem solving, and policy setting, improves administrative processes and organizational effectiveness, contributes knowledge to academic disciplines, and develops the quality of graduate education." Faculty research is an important component of System Management's mission, and it is integrated to the greatest possible extent with the educational process. Students are encouraged to participate in faculty projects, and faculty research results are typically incorporated in classroom instruction. The department's research efforts are augmented through its affiliation with the Institute for Defense Education and Analysis (IDEA) and by the participation of adjunct professors in many specialty areas. In 1996, Systems Management faculty were engaged in a broad range of research activities, with approximately \$6 million in reimbursable funding from sponsors in the Department of Defense and the military services. For ease of exposition, the department's research projects during 1996 can be grouped into six functional areas: Acquisition and Contracting; Logistics and Transportation; Information Technology Management; Financial Management; Manpower Systems Analysis; and Organization, Management, and Policy Analysis. Research in these six areas is summarized below.

### **Acquisition and Contracting**

Research in Acquisition and Contracting focused largely on support activities for the departmental program in Systems Acquisition Management. This included support for Army thesis students, an acquisition library and librarian, as well as other functions. In addition, the Defense Acquisition University (DAU) supported the Center for Acquisition Education, Training, and Research (CAETR), which administers courses offered by NPS faculty from various departments and groups. (NPS is a consortium member of DAU.) In 1996, CAETR developed a concept known as JRAPIDS (for Joint Rapid Prototype and Integrated Product Team Development Structure). JRAPIDS is essentially an educational approach or strategy for delivering the DAU Intermediate Systems Acquisition Course (ACQ-201). Research activities in 1996 also included the development and delivery of a graduate course—Principles of Program Management—through video teleconferencing, to meet workforce education requirements specified in the Defense Acquisition Workforce Improvement Act. Further, NPS sponsored several research activities. These included the development of a "blueprint" for research in defense acquisition; a study of changes to information technology acquisition resulting from the Information Technology Management Improvement Act; and conference planning for the DAU faculty.

### **Logistics and Transportation**

Systems Management faculty conducted a number of research projects in Logistics and Transportation during 1996. Most of the research centered on modeling and simulation, including a continuing project to develop a wholesale-level inventory model for the Navy's Inventory Control Points to use in replenishing their inventories of repairable items. Another continuing project involved the development of models to predict savings in costs associated with the Naval Aircraft Engine Component Improvement Program. This particular effort focused on life-cycle costs of proposed engineering changes intended to improve the reliability, maintainability, and sustainability of turbine aircraft engines for Naval aircraft. Faculty research continued in two additional areas during 1996: development of a Best Value model for Rapid Acquisition of Manufactured Parts (RAMP) facilities; and production of a new textbook, titled *Navy and Defense Inventory Management*. (This textbook will replace NAVSUP Publication 553, *Inventory Management*, published in 1983.) Three research projects in 1996 were sponsored by NPS. These included a study of strategic changes over an 18-year period (1976-1993) in the U.S. motor carrier industry's Less Than Truckload (LTL) segment; the development of a general model that addresses the welfare economics of product and service quality (to build a framework for assessing the quality of service between Department of Defense and Department of the Navy units); and a study of problems in the layout and design of freight terminals for the LTL motor carrier industry.

## DEPARTMENT SUMMARY

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### **Information Technology Management**

The department's Information Technology Management (ITM) faculty conducted a number of research projects in 1996, including: development of a client-server software reliability model; implementation of a software reliability program for the U.S. Marine Corps Tactical System Support Activity; development of an improved Ethernet performance model that would offer greater detail of analysis and incorporate all components of a LAN; an assessment of U.S. Coast Guard communications systems for its recapitalization program; identification of requirements for future protocols that provide for multicasting in the Internet; a study of the commercial satellite industry, Internet working technology, and related applications for oceanographic research (as well as extending the Internet to sea); development of computer-supported collaborative work for intercultural negotiation; the design of information systems to support traceability of corporate memory and databases that can "navigate" through time and space using heterogeneous systems; and an exploratory analysis (using contemporary and emerging analytical techniques) of the Comprehensive Clinical Evaluation Program database in an attempt to identify relationships/patterns associated with Gulf War Syndrome. In addition, ITM faculty developed a software infrastructure for DecisionNet, an electronic environment of decision support and modeling technologies, delivered over a distributed global network (such as the World Wide Web). Other research sought to develop a prototype expert system for maintenance of the MK92 Fire Control System; perform a comparative analysis of document workflow manager applications (to support Port Hueneme Division, Naval Surface Warfare Center); perform three tasks (database analysis, network analysis, and operational analysis) to design and create an open, integrated system for the Tomahawk missile community; investigate alternative architectures for a unified view of ports and airfields data that are otherwise represented and developed differently; and assist the Marine Corps Institute in designing a more contemporary automated information system. Further, ITM faculty were engaged in the following: research that would help to capture design rationale in knowledge-based software engineering; research aimed at creating a model of requirements traceability to support various stakeholders in large-scale systems development; and a study of optimal policies for configuring cellular networks, including an assessment of the impact of these policies on cost and the quality of service.

### **Financial Management**

Research projects in financial management during 1996 included an analysis of financial condition scoring models for defense industry firms—a continuing effort sponsored by NPS. Other research sought to describe and critique the current state of financial accounting and reporting, as practiced within the Department of Defense. The Office of the Secretary of Defense (Health Affairs) sponsored a project to design, develop, and test an executive education program on financial management for senior health care officers in the Army, Navy, and Air Force. One aspect of this focused specifically on educating Department of Defense healthcare financial managers in the TRICARE system. Additional research in financial management involved an assessment of the impact of budget reductions—as well as a study of management control systems and accounting changes that respond to budget austerity—in the AIRPAC, PACFLT command; an evaluation of the impact of the Chief Financial Officer's Act and the Government Performance and Results Act, along with other financial management legislation, on the Department of Defense; and the development of Department of Defense Financial Management Education and Training.

### **Manpower Systems Analysis**

Faculty in Manpower Systems Analysis come from a variety academic disciplines, and associated research projects reflect this diversity of interests and expertise. For example, research in 1996 included a continuing "lessons learned" study of the All-Volunteer Force to assist Department of Defense policy makers in charting a course for the future. In addition, several analyses were performed in support of a major Department of Defense effort, the "Officer Pipeline Study," focusing on opportunities for women and minorities in the military's officer corps. Other Manpower Systems Analysis research included the following: a study of policies to deal with unsatisfactory participants in the U.S. Army Reserve; several studies in support of the Chief of Naval Personnel, including the development of models to analyze the retention behavior of Navy officers; a cost-benefit analysis of the Navy's drug-testing program; the development of a Bonus Incentive Recruiting Model (BIRM) for Army enlisted recruiting; and the development of a geographic information system to assist the U.S. Army Reserve in determining desirable locations for units based on personnel, logis-

## DEPARTMENT SUMMARY

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tical support, facilities, and training opportunities. In addition, manpower systems faculty conducted a study to develop metrics for tracking military readiness and providing an "early warning" system; and a study of Department of Defense inventory management training. NPS also sponsored research looking at the effect of recent changes in children's family circumstances on the projected educational levels of future entrants to the labor market (particularly the military's pool of prospective recruits). The Institute for Joint Warfare Analysis sponsored two manpower-related studies: an assessment of the operating and support costs of Joint Force Packages, and an effort to identify and describe the conceptual aspects of Dominant Battlefield Awareness.

### **Organization, Management, and Policy Analysis**

Research in Organization, Management, and Policy Analysis often intersects with other functional areas, as discussed above. During 1996, Systems Management faculty were engaged in a project to support the Eighth Quadrennial Review of Military Compensation—specifically with respect to the role of intrinsic factors in motivating performance among military personnel. Additionally, department faculty conducted a study to identify leadership behaviors (by commanders of company-level units in the U.S. Army Reserve) that would increase measures of readiness and personnel retention; a related study to raise levels of readiness and personnel retention in the U.S. Army Reserve through improved leadership training; and further research to increase readiness and personnel retention in such units by measuring strong and weak leadership areas of unit commanders. Continuing research looked at the role of organizational culture, core values, and related organizational factors in "reinvention" efforts by the Military Sealift Command. A study was also undertaken in support of the Naval Air Warfare Center, Aircraft Division, as the Center prepared to shut down (by direction of the Base Realignment and Closure Commission). At the same time, faculty research continued in the following: a study to determine the sources of resistance to gender integration in the Navy; an effort to empirically examine the dynamics of change in public organizations; and a study to determine if revised interpretive styles affect the way in which employees perceive and react to stress.

The Department of Systems Management was also the home of four research centers in 1996, including the Center for Information and Policy Analysis, the Software Metrics Center, the Center for Acquisition Education, Training, and Research (as noted above), and the Center for Diversity Analysis. In addition, Systems Management supported research laboratories for the following: software metrics, DecisionNet, enterprise architecture, multimedia systems, hands-on network systems, and Internet-to-sea. More detailed information on specific research projects—along with a list of related publications, conference presentations, student theses, patents, and other research products—is presented below.

## PROJECT SUMMARIES

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### REVISING INTERPRETIVE STYLES TO REDUCE WORKPLACE STRESS

Robert Barrios-Choplin, Visiting Assistant Professor  
Department of Systems Management  
Sponsor: Unfunded

**OBJECTIVE:** The purpose of this research is to determine if revised interpretive styles affect the way employees perceive and react to stressors. Theoretical models of the stress process predict an important moderating effect for cognitive appraisal on the strength of stress responses. This series of studies evaluates the effect of an "Inner Quality Management" seminar on the stress responses of a variety of employees in multiple settings.

**SUMMARY:** During 1996, five studies were completed and analyzed. Results have been incorporated into academic papers in various stages of completion. The research is ongoing.

#### PUBLICATIONS:

Barrios-Choplin, B., McCraty, R., and Cryer, B., "A New Approach to Reducing Stress and Improving Physical and Emotional Well Being at Work," *Stress Medicine*, 1997, accepted.

McCraty, R., Barrios-Choplin, B., Sundram, J., and Atkinson, M., "Assessing the Effect of Employee Self-management Training on Change-induced Turmoil and Stress," *Academy of Management Annual Conference*, 1996, submitted.

#### CONFERENCE PRESENTATIONS:

Rozman, D., Barrios-Choplin, B., and McCraty, R., "The Effect of Four Types of Music on Mood, Tension, and Mental Clarity," *Eighth International Montreux Congress on Stress*, Switzerland, February 1996.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Stress, self-management, interpretive styles

### DecisionNET: AN ELECTRONIC LIBRARY OF DECISION TECHNOLOGIES

Hemant K. Bhargava, Associate Professor  
Department of Systems Management  
Sponsor: U.S. Army Artificial Intelligence Center and  
Naval Postgraduate School-Institute for Joint Warfare Analysis

**OBJECTIVE:** Development of software infrastructure for DecisionNet, an electronic environment of decision support and modeling technologies, delivered over a distributed global network such as the World Wide Web was proposed. Specific tasks include developing features to allow technology providers to register technologies with the library, and determining overall functionality of DecisionNet and developing models of intelligent agents that will perform these functions.

**SUMMARY:** DecisionNet is available on the World Wide Web at <http://131.120.39.66/>. The DecisionNet software is based on the (agents in terms of states and acceptable messages) formal approach discussed in our WITS paper. The behavior of DecisionNet agents is described in terms of their current state (stored in database tables), messages acceptable in each state (determined via SQL queries), and actions taken in response to a particular message received in a particular state (also implemented using SQL queries). Current functionality includes user and provider registration, yellow-pages (listing and search), technology check-in for independent technologies, web-based execution of decision technologies, limited support for check-in of exclusive technologies, and user and technology usage accounting.

## PROJECT SUMMARIES

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### PUBLICATIONS:

Bhargava, H.K., Krishnan, R., and Müller, R., "Decision Support on Demand: Emerging Electronic Markets for Decision Technologies," Decision Support Systems, Vol. 20, 1996.

Bhargava, H.K., Krishnan, R., and Müller, R., "Electronic Commerce in Decision Technologies: A Business Cycle Analysis," forthcoming, International Journal of Electronic Commerce (1997), last revised August 1996, accepted.

Bhargava, H.K., and Norris, R., "Coming Soon to Your Favorite Library: Decision Support on Demand," D-Lib Magazine, Corporation for National Research Initiatives, June 1996, (ISSN 1082-9873), <http://www.dlib.org/dlib/june96/06contents.html>.

Günther, R., Müller, R., Schmidt, P., Bhargava, H.K., and Krishnan, R., "Designing a Distributed Information System for Collaborative Statistical Computing," in Informationsserver für das Internet: Anforderungen, Konzepte, Methoden, Proceedings EMISA-Fachgruppentreffen 1996, (CEUR Workshop Proceedings, ed: M. A. Jeusfeld), 1996.

Bhargava, H.K., and Sridhar, S., "Design Issues in Configuring Servers on the World Wide Web," Proceedings of the First INFORMS Conference on Information Systems and Technology (Washington, DC), pp. 204-208, 5-8 May 1996.

Bhargava, H.K., Krishnan, R., Roehrig, S., Kaplan, D., Casey, M.P., and Müller, R., "Model Management in Electronic Markets for Decision Technologies: A Software Agent Approach," Proceedings of the Thirtieth Hawaii International Conference on System Sciences (Maui, HI), January 1997.

### CONFERENCE PRESENTATIONS:

Bhargava, H.K., Krishnan, R., and Müller, R., "Information Networking for Decision Support: The DecisionNet Project," INFORMS National Meeting, Atlanta, GA, 3-6 November 1996.

Bhargava, H.K., "Decision Support via the World Wide Web," Tutorial on DSS and the Web (IFIP WG8.3 Conference), London, U.K., 21 July 1996.

Bhargava, H.K., and Krishnan, R., "Leveraging the WWW: The Decision Net Project," INFORMS National Meeting, Washington, DC, 5-8 May 1996.

Bhargava, H.K., Krishnan, R., Roehrig, S., and Müller, R., "Implementing Networks of Decision Technologies," INFORMS National Meeting, Washington, DC, 5-8 May 1996.

Bhargava, H.K., Krishnan, R., Roehrig, S., Müller, R., and Kaplan, D., "On the Analysis and Design of Transactions in DecisionNet," INFORMS National Meeting, Washington, DC, 5-8 May 1996.

Bhargava, H.K., Krishnan, R., Roehrig, S., and Müller, R., "Implementing Networks of Decision Technologies," INFORMS National Meeting, Washington, DC, 5-8 May 1996.

Bhargava, H.K., and Krishnan, R., "Leveraging the WWW: The Decision Net Project," INFORMS National Meeting, Washington, DC, 5-8 May 1996.

Bhargava, H.K., and Sridhar, S., "Design Issues in Configuring Servers on the World Wide Web," First INFORMS Conference on Information Systems and Technology, Washington, DC, 5-8 May 1996.

### THESES DIRECTED:

West, D., "The Digital Library Phenomenon: Opportunities and Implications for the Naval Service," Master's Thesis, Naval Postgraduate School, September 1996.

## PROJECT SUMMARIES

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Norris, R., "The Digital Library Phenomenon: Opportunities and Implications for the Naval Service," Master's Thesis, Naval Postgraduate School, September 1996.

Parker, V., "A Database Approach to Maintaining the Information Technology Management Group Faculty Research Catalog on the World Wide Web," Master's Thesis, Naval Postgraduate School, September 1996.

Earley, S.H., "Decision Net: A Database Approach," Master's Thesis, Naval Postgraduate School, September 1996.

Rogers, P., "Indexing and Retrieval in Digital Libraries: Developing Taxonomies for a Repository of Decision Technologies," Master's Thesis, Naval Postgraduate School, March 1996.

Protacio, P., "Implementing a Decision Support System on the World Wide Web," Master's Thesis, Naval Postgraduate School, March 1996.

Casler, J., "Infrastructure Considerations for World Wide Web Servers," Master's Thesis, Naval Postgraduate School, June 1996.

Palumbo, J.R., "Financial Transaction Mechanisms for World Wide Web Applications," Master's Thesis, Naval Postgraduate School, March 1996.

Brownlee, D.G., "Pricing Information Services in Electronic Markets: Case Study of DecisionNet," Master's Thesis, Naval Postgraduate School, March 1996.

### OTHER:

Bhargava, H.K., "DecisionNet: World Wide Access to Executable Decision Technologies," a condensed news summary published in IIE News (newsletter of the Operations Research society of the Institute of Industrial Engineers), Summer 1996, Vol. 32, No. 2.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software, Modeling and Simulation

**KEYWORDS:** Distributed decision support, internet, distributed modeling

### EXPLORATORY ANALYSIS WITH THE COMPREHENSIVE CLINICAL EVALUATION PROGRAM (CCEP) DATABASE

Hemant K. Bhargava, Associate Professor

Department of Systems Management

**Sponsor:** Office of the Assistant Secretary of Defense (Health Affairs)

**OBJECTIVE:** The CCEP database contains demographics, attributes, and results of comprehensive medical evaluations on Persian Gulf War veterans. The purpose of this research is to apply conventional and emerging data analysis techniques to the CCEP database, aiming to discover relationships and patterns that may provide answers to health problems reported by Persian Gulf War veterans.

**SUMMARY:** In analyzing the Gulf War syndrome, a novel approach-involving an encoding and solution using a genetic algorithm-to knowledge discovery in large (high-complexity) databases was developed. A general purpose system for exploratory data analysis of such databases resulted. Experiments on the CCEP database, so far, reveal no single syndrome i.e., no group of over 100 participants was found, sharing a common reported exposure/demographic information, and exhibiting a unique set of reported symptoms and/or outcome diagnoses), but numerous correlation (of exposure/demographic information and associated symptoms/diagnoses) do exist that require additional clinical analysis. These correlation suggest that smaller groups may share common health conditions based on shared exposure

## PROJECT SUMMARIES

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to common health risk factors. These associations are based solely on statistical correlation; therefore, a final determination is withheld pending review of the information by medical professionals.

### **PUBLICATION:**

Bhargava, H.K. and Jacobson, D.L., "Exploratory Data Analysis with Genetic Algorithms: Is there a Gulf War Syndrome?" Proceedings of the Second INFORMS Conference on Information Systems and Technology (San Diego, CA), May 1997, accepted.

### **THESIS DIRECTED:**

Jacobson, D.L., "Using Genetic Algorithms to Search Large, Unstructured Databases: The Search for Desert Storm Syndrome," Master's Thesis, Naval Postgraduate School, September 1996.

### **OTHER:**

Bhargava, H.K. and Jacobson, D.L., "Genetic Algorithms in the Search for Desert Storm Syndrome," Proceedings of the 1997 HealthCare Information and Management Systems Society Sciences, San Diego, CA, accepted.

Bhargava, H.K. and Jacobson, D.L., "Genetic Storms: Investigating the Gulf War Syndrome," Proceedings of the Thirtieth Hawaii International Conference on System Sciences, Maui, HI, accepted.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software, Other (Data Analysis)

**KEYWORDS:** Gulf War Syndrome, genetic algorithms, exploratory data analysis, heuristic search

### **ADVANCED NETWORK PROTOCOLS**

**Rex Buddenberg, Lecturer**

**Department of Systems Management**

**Sponsor: Naval Postgraduate School-Institute for Joint Warfare Analysis**

**OBJECTIVE:** Define requirements for next generation set of protocols that provide for multicasting and gradually overtake the current TCP-based (unicast) protocols in the Internet.

**SUMMARY:** Current TCP/IP protocols used in the Internet provide reliable unicasting service and non-reliable multicasting service. The character of the data and the physical constraints imposed by radio networks require that we generate a set of reliable multicasting protocols that are a generation beyond the current TCP/IP offerings. Defining the requirements and a strategy for change (graceful evolution of the present Internet) is the central challenge.

### **CONFERENCE PRESENTATION:**

Buddenberg, R., "The Coming Revolution in Ship-Shore Communications," Command and Control in the Information Age Symposium, June 1996.

**DoD KEY TECHNOLOGY AREAS:** Command, Control and Communications

**KEYWORDS:** Networking, internetworking

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### SEANET INDUSTRY ASSESSMENT

Rex Buddenberg, Lecturer

Department of Systems Management

Sponsor: National Science Foundation

**OBJECTIVE:** Provide continuing current information to NSF and the university oceanographic community on the commercial satellite industry, internetworking technology and its applications to oceanographic research and extension of the Internet to sea.

**SUMMARY:** Used the lab funding in this proposal to build an Internet to sea lab which will be used both as an educational tool and as a testbed for commercial satellite communications and internetwork products. This NSF-funded work is quickly growing into an effort to subsidize a commercial service into operation. This second chapter starts with the same oceanographic research customer base but now, with ONR funding, focusing is on catalyzing a commercial Internet service, much as NSF's subsidies between 1988 and 1993 helped the Internet itself to grow from thousands to millions of users.

**DoD KEY TECHNOLOGY AREAS:** Command, Control and Communications, Sensors

**KEYWORDS:** Internetworking

### U.S. COAST GUARD NETWORK MANAGEMENT

Rex Buddenberg, Lecturer

Department of Systems Management

Sponsor: U.S. Coast Guard

**OBJECTIVE:** Provide consulting advice to USCG as it recapitalizes an obsolete communications system.

**SUMMARY:** Defined a network-centric architecture and prioritization, including privatization of hitherto in-house infrastructure.

**DoD KEY TECHNOLOGY AREAS:** Command, Control and Communications, Computing and Software, Human Systems Interface, Sensors

**KEYWORDS:** Internetworking, mobile platforms

### TRICARE CONTRACTING

Sandra M. Desbrow, Assistant Professor

Department of Systems Management

Sponsor: Office of the Secretary of Defense (Health Affairs)

**OBJECTIVE:** The objective of this project was to create an organized body of knowledge on the topic of DoD healthcare contracting and relevant ethics issues and to produce a cutting-edge module that could be used for educating DoD Healthcare Financial Managers in the TRICARE system.

**SUMMARY:** Due primarily to the rapidly increasing cost of the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS), DoD is in the process of implementing several initiatives to manage better both the health care for beneficiaries and the costs of services provided. These include increased managed care contracting, the greater use of fiscal intermediaries, and the conversion of the traditional CHAMPUS benefits structure to a system known as TRICARE. TRICARE converts the current fee-for-service based indemnity-type insurance plan into a three-option program that allows the beneficiaries to determine the plan that best meets the individual's needs. Because this is a new method of providing healthcare services within DoD, the procedures and vehicles used for contracting with

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private providers are in a constant state of change as lessons learned are incorporated into each new contract and existing contracts are modified. Accordingly, there is a dire need within the DoD healthcare community for instruction to provide all those involved in healthcare management with the most up-to-date training to insure that all beneficiaries receive the best care at the lowest possible cost to the Government. A complete review of both the DoD healthcare system and contracts was performed along with an analysis of existing processes and contractual documents used by the private sector. An enhanced understanding of the current healthcare systems within the Government and private industry was achieved along with suggestions for improving the existing DoD healthcare system.

### **OTHER:**

Desbrow, Sandra M., "TRICARE Contracting," 33-page handout with computer-generated visuals for the TRICARE Financial Management Executive Education Program (TEMEEP), October 1996.

### **CONFERENCE PRESENTATION:**

"TRICARE Contracting," Financial Management Executive Education Program Conference, 22 October 1996.

### **THESIS DIRECTED:**

Cox, Robert R., "The TRICARE Managed Care Support Contract: An Analysis on the Bid Price Adjustment and Resource Sharing," Master's Thesis, Naval Postgraduate School, December 1996.

### **DoD KEY TECHNOLOGY AREAS:** Other

**KEY WORDS:** Bid price adjustment, CHAMPUS, Government contracts, health care, managed care, resource sharing, TRICARE, procurement integrity

### **GENDER INTEGRATION IN THE UNITED STATES NAVY**

Frank J. Barrett, Associate Professor  
Department of Systems Management  
Sponsor: Naval Postgraduate School

**OBJECTIVE:** To determine the sources of resistance to gender integration in the U.S. Navy.

**SUMMARY:** During the current year a model of gender relations was developed. The model outlines how men construct definitions of masculinity that marginalize women attempting to enter the U.S. Navy. It was found that male officers construct various identities based on job speciality and that these identities depend in part on marginalizing women. In this culture, female officers adopt three different strategies to cope with the masculine ideologies: masculine strategy, feminine strategy, and a de-gendering strategy.

### **PUBLICATIONS:**

Barrett, F.J., "The Organizational Construction of Masculine Hegemony: The Case of the U.S. Navy," Gender, Work, and Organizations, Vol. 3, No. 3, pp. 129-142, July 1996.

Barrett, F.J., "Gender Strategies of Women Naval Officers," Women's Research and Education Institute Proceedings, Conference on Women in Uniformed Services, December 1996.

### **CONFERENCE PRESENTATIONS:**

Barrett, F.J., "Gender Strategies of Women Naval Officers," Women's Research and Education Institute, Conference on Women in Uniformed Services, December 1996.

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Barrett, F.J., "Alternative Masculinities in the U.S. Navy," Presented at National Academy of Management, Cincinnati, OH, 1996.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Gender integration, gender relations

### **ECONOMICS OF SUPPORT SERVICE QUALITY**

**David G. Brown, Visiting Assistant Professor**

**Department of Systems Management**

**Sponsor: Naval Postgraduate School**

**OBJECTIVE:** This project is concerned with developing a general model that addresses the welfare economics of product and service quality, and which provides a framework for examining the quality of service between DoN and DoD units. This is a continuation of the unfunded project from FY95 entitled "Generic Product and Service Quality Economics."

**SUMMARY:** Activity during 1996 was primarily concerned with continuing model development and with laying groundwork for DoD applications. Previously, a model had been developed based on a specialized demand function and had started working with a general demand structure. During FY96, the rigor of the general demand structure model was reinforced through an examination of the implied utility function characteristics and individual demand functions. This general model was then extended to include all the relationships previously established with the specialized demand structure. A substantial amount of time was spent exploring the algebraic structure of the model and developing the "story" behind this structure. The most significant discovery this past year is a class of utility functions which have the property that their derived demand and indirect utility functions have the same level curves in the space defined by price and the quality variable. In this model, each demand function may be generated by a whole family of utility functions. Therefore, the presence and role of "demand-coincident" utility functions in the topology of these families is an important issue. The principal remaining work in the general model development is a side-by-side comparison between this approach and that used by Spence in his seminal 1975 article "Monopoly, Quality and Regulation."

**DoD KEY TECHNOLOGY AREAS:** Modeling and Simulation

**KEYWORDS:** Economics, surplus, product quality, service quality

### **WELFARE ECONOMICS OF FREIGHT SERVICE QUALITY**

**David G. Brown, Visiting Assistant Professor**

**Department of Systems Management**

**Sponsor: Naval Postgraduate School**

**OBJECTIVE:** The goal of this project is to investigate the welfare economics associated with incremental changes in freight service quality. This includes developing a shipper surplus model which treats service quality as a second price in addition to freight rate, using this welfare measure to determine a characterization of socially optimal service quality, and then examining issues such as carrier competition and freight rate regulation relative to this characterization. This is a continuing project from last year and before.

**SUMMARY:** Activity during 1996 was primarily concerned with significantly revising a paper discussed in last year's project summary to emphasize the "story" and de-emphasize the mathematics of the model. Further significant work in this area is on hold, awaiting the completion of my related project on generic product and service quality economics.

## PROJECT SUMMARIES

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**DoD KEY TECHNOLOGY AREAS:** Modeling and Simulation

**KEYWORDS:** Transportation economics, freight service quality, welfare economics, shipper surplus, full price

**TODAY'S CHILDREN, TOMORROW'S WORKFORCE:  
IMPLICATIONS OF THE CHANGING FAMILY CIRCUMSTANCES  
ON THE QUALITY AND DIVERSITY OF THE FUTURE WORKFORCE**

Michael D. Cook, Visiting Assistant Professor

Department of Systems Management

Sponsor: Naval Postgraduate School

**OBJECTIVE:** This project investigates the effect of recent changes in childrens' family circumstances on the future educational attainment of future labor market entrants. It specifically focuses on the implications these trends have for future recruiting pools of the U.S. Military. It also looks at how these trends may differ across different race and ethnic groups and the implications that these trends have for the future diversity goals of the U.S. Military. This work is continuation of a project begun in 1995.

**SUMMARY:** A child's family background has been shown to have a strong effect on educational attainment, the development of cognitive skills, and on future labor market success. Given this strong connection between family background and future performance there are two recent trends that may have disturbing implications for the quality and diversity of the future workforce. First, there appears to be a worsening of the family circumstances in the lower tail of the income distribution. There has been a substantial growth in the number of single parent families as well as a general increase in income inequality with a concomitant increase in the number of children living in households with very low incomes and an increase in the number of children living in high poverty areas.

Second, it appears that the gap in the family circumstances of white and black children may be growing. Up to the mid to late 1980's, the family circumstances of minority (especially African-American) children improved substantially, both absolutely and relative to white children. This trend appears to be reversing. The convergence in white and black incomes have stalled, and the number of black children living in poor households and in single parent families are increasing. The gap in the family circumstances of white and Hispanic children has also widened recently.

This project investigates the effects of these recent changes in family circumstances to the quality of the future workforce. The study focuses on changes over the next twenty years. The specific research questions address in this project are:

- What are the implications of recent trends in family background on the educational attainment of labor market entrants (age 18-21) over the next twenty years?
- What are the implications of these trends on the future recruiting pools of the U.S. Military?
- How do these trends vary by racial and ethnic groups and what are the implications for the future diversity goals of the U.S. Military?
- Do present recruiting goals appear feasible given these expected trends in educational attainment?

It is expected that this research will benefit the planning of future recruiting efforts as well as military force planning in general. The results of this research will help determine future accession standards and recruiting goals (in terms of numbers as well as quality), as well as producing valuable information in planning future force structure. Additionally, once recruiting goals are set this information will be useful in determining the resources and targeting needed to meet those goals.

**PUBLICATIONS:**

Cook, M.D., and Evans, W., "Families or Schools?: Accounting for the Convergence in White and Black Test Scores," The Journal of Labor Economics, August 1996, submitted.

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### CONFERENCE PRESENTATION:

Cook, M.D., "What Went Right?: Understanding the Convergence in White And Black High School Graduation Rates," Western Economic Association Meetings, San Francisco, CA, July 1996.

**DoD KEY TECHNOLOGY AREAS:** Other

**KEYWORDS:** Recruiting, force planning

### A GEOGRAPHIC INFORMATION SYSTEM (GIS) APPROACH TO USAR UNIT READINESS

**Daniel R. Dolk, Professor**  
**G.W. Thomas, Associate Professor**  
**Department of Systems Management**  
**Sponsor: U.S. Army Reserves**

**OBJECTIVE:** The objective is to develop a GIS-based decision support system to assist the USARC in determining desirable locations for units based upon personnel, logistical support, facilities and training opportunities.

**SUMMARY:** A decision support system (ARIES: Army Reserve Installation Evaluation System) which integrates geographical information system (GIS) software with multicriteria decision model software (Logical Decisions for Windows) was developed to provide a powerful managerial tool. Twenty decision parameters of the unit relocation decision were identified and organized into a goal hierarchy. For each parameter, a utility, or tradeoff, function was defined which translates any parameter value into an appropriate normalized utility value. Preference sets, or relative weights, were then assigned across the set of decision parameters. An industrial strength database was built from which to retrieve values for each of the decision parameters. With this database-supported decision model, the user can select between two to five geographical sites to compare in the context of the decision parameters. The site selection is done on a map and the DSS automatically evaluates each site and displays the results of the comparisons. Sensitivity analysis can be done on any individual parameter or combination of parameters. ARIES is currently under development and will be delivered to USARC in the 2nd quarter of 1996.

**DoD KEY TECHNOLOGY AREAS:** Modeling and Simulation, Manpower, Personnel and Training

**KEYWORDS:** Multi-criteria decision model, geographical information system

### METRICS FOR MILITARY READINESS

**Daniel R. Dolk, Professor**  
**S.S. Liao, Professor**  
**Department of Systems Management**  
**Sponsor: Defense Manpower Data Center**

**OBJECTIVE:** Military readiness is a phenomenon much talked about but little analyzed. Measurements for readiness tend to be highly subjective and tailored to the situation at hand. This project examines the relevance of multiattribute theory, complexity theory, and nonparametric statistical techniques for developing metrics which provide management indicators for tracking readiness. The metrics should be able to provide an "early warning system" for detecting degradation of readiness during peacetime.

**SUMMARY:** A decision-based methodology and associated decision support prototype for readiness metrics based upon the synthesis of multi-criteria decision models and geographic information systems (GIS) was developed. The system allows readiness metrics to be developed and applied to any existing DPMC or other military databases which contain a significant geographic dimension. The system has been applied to a U.S. Army Reserve Unit relocation problem.

## PROJECT SUMMARIES

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**DoD KEY TECHNOLOGY AREAS:** Modeling and Simulation, Manpower, Personnel and Training, Computing and Software

**KEYWORDS:** Readiness, genetic algorithm, data mining, geographical information system

### NAVAL POSTGRADUATE SCHOOL SUPPORT FOR MILITARY SEALIFT COMMAND REINVENTION EFFORTS

Lee Edwards, Visiting Assistant Professor

Department of Systems Management

Sponsor: Military Sealift Command

**OBJECTIVE:** This research continued support for MSC reinvention started in FY 95. The goal of this sub-project was to assist MSC in identifying, planning, implementing, and evaluating a program management knowledge base for top-level managers and staff directors. The sub-project was to further prepare key executives for a reinvented MSC, re-established under functional business lines.

**SUMMARY:** During the project year, the executive education and management development efforts were completed in three phases:

1) An assessment of the current and needed knowledge base of the program managers. This was done through interviews and a brief survey questionnaire. The product was the design for implementation of a series of three MSC executive and management educational sessions.

2) The series of three educational sessions were held at off-site locations. The first session had the objectives of understanding major organizational functions and interrelationships. The second session provided a basis for program decision-making through knowledge of federal laws, applicable acts, and government processes. The third session was a tailored, executive program management course held at Defense System Management College for MSC Program Managers.

3) The third product was the review, development, and publication of a Continuing Executive Education and Management Development catalog to be the corner stone of MSC's FY97 education and development effort. This was considered an essential part of the transition of MSC and its subordinate commands to the reinvented organization.

**DoD KEY TECHNOLOGY AREAS:** Other (Organizational Effectiveness)

**KEYWORDS:** Organizational change; reinvention; reengineering; executive education; management development

### AMERICA'S ALL-VOLUNTEER FORCE

Mark J. Eitelberg, Associate Professor

Department of Systems Management

Sponsor: Office of the Assistant Secretary of Defense (Force Management Policy)

**OBJECTIVE:** The goal of this project is to chronicle the manpower policies and programs that succeeded—or failed—in sustaining the All-Volunteer Force (AVF); and to provide a “lessons learned” evaluation that will assist in setting a course for the future.

**SUMMARY:** Information has been gathered from three major sources: published research, Congressional reports and Department of Defense documents; data maintained by the Defense Manpower Data Center; and interviews with current and former officials in the Department of Defense who were directly involved in designing or executing manpower policies during the AVF era (1973-present). Contractor support was obtained for three phases of the research: a study of the evolution of the AVF; an assessment of the “effectiveness” of the military since the end of the draft; and an evaluation of the military’s experience in Operation Desert Shield/Desert Storm, a defining moment of the AVF. Students at the Naval Postgraduate School have also made important contributions—in the form of project papers and

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theses—to the research effort. This study is a multi- year effort that looks at ten major areas, including recruiting, compensation, population participation, changing missions, and other topics.

### **PUBLICATIONS:**

Eitelberg, M.J. , "The All-Volunteer Force After Twenty Years," *Professionals on the Front Line: Two Decades of the All-Volunteer Force*, J.E. Fredland, C.L. Gilroy, R.D. Little, and W.S. Sellman, eds., Brassey's, 1996.

Eitelberg, M.J., "Defense Advisory Committee on Women in the Services: Utilization of Women Indicator Report," Department of Defense, Monterey, CA, Defense Manpower Data Center/Naval Postgraduate School, Naval Postgraduate School, September 1996.

### **CONFERENCE PRESENTATIONS:**

Eitelberg, Mark J., "Aviation Selection Testing: The Effect of Minimum Test Scores on Minorities," "Diversity in the Military," "First-Term Attrition Due to Pregnancy in the Marine Corps," "Preservice Legal Encounters and Unsuitability Attrition in the Navy," "Effectiveness of Fundamental Applied Skills Training (FAST) Program," "Retention After the Downsizing," and "Officer Pipeline Study," Annual Meeting of Technical Panel UTP-3, Military Human Resources Issues, The Technical Cooperation Programme (TTCP), Victoria, British Columbia, Canada, 17-22 July 1996.

Eitelberg, Mark J., "Women in the Military: Trends and Data Resources," Defense Advisory Committee on Women in the Services, Subcommittee on Forces Development and Utilization, Joint- Service Working Group, Monterey, CA, 13-15 August 1996.

### **THESES DIRECTED:**

Etnyre, R.P., "Naval Leadership and Society," Master's Thesis, Naval Postgraduate School, December 1996.

Frabutt, A.J., The Effects of Pre-Service Legal Encounters on First-Term Unsuitability Attrition in the U.S. Navy," Master's Thesis, Naval Postgraduate School, March 1996.

Lake, M.A., "Study of Navy Personnel with Criminal Records: Characteristics of Offenders and Career Implications," Master's Thesis, Naval Postgraduate School, December 1996.

Lawson, S.A., "The Effects of Marriage on Cohesion of Fleet Marine Force Units," Master's Thesis, Naval Postgraduate School, December 1996.

Tomlinson, Cynthia A., "Fundamental Applied Skills Training (FAST) Program Measures of Effectiveness," Master's Thesis, Naval Postgraduate School, March 1996.

### **DoD KEY TECHNOLOGY AREAS: Manpower, Personnel and Training**

**KEYWORDS:** Military manpower, personnel, recruitment, population representation, compensation, force management, roles/missions, attrition, military accession policy

#### **OFFICER PIPELINE STUDY**

**Mark J. Eitelberg, Associate Professor**

**Department of Systems Management**

**Sponsor: Office of the Under Secretary of Defense (Personnel and Readiness)**

**OBJECTIVE:** The goal of this project was to conduct a follow-up study of special issues related to the recruiting, selection, promotion, and retention of women and racial/ethnic minorities in the military's officer corps.

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**SUMMARY:** In March 1994, Secretary of Defense William Perry directed the Under Secretary of Defense (Personnel and Readiness) to lead a major study of the officer "pipeline" and to recommend ways that would improve the flow of female and minority officers from recruitment through general and flag officer ranks. Researchers at NPS conducted several analyses for the DoD "Officer Pipeline Study." The NPS portion of the original study was divided into four tasks: a review of trends and current issues; an analysis of DoD data on the accession, promotion, and retention of minority officers over time (with emphasis on the period of the defense drawdown); an analysis of the promotion, retention, and success of minority junior officers in the Navy using a specially-constructed data file that includes measures of individual performance and promotion board outcomes; a study of the promotion and retention of minority officers in the Marine Corps, likewise incorporating information on promotion board results and individual performance. Additional, follow-up analyses were conducted as part of this "special issues" project. The results of the original study and follow-up analyses will be published as part of a DoD report.

### PUBLICATIONS:

Department of Defense, "Minorities and Women in the Officer Pipeline," Office of the Under Secretary of Defense, forthcoming (1997).

Eitelberg, M.J. and Mehay, S.L., "Women and Minorities in the Officer Pipeline," Working Paper, Naval Postgraduate School, 1996.

Mehay, S.L., "Minority Status and the Performance of Junior Officers in the Navy and Marine Corps," Working Paper, Naval Postgraduate School, 1996.

### THESES DIRECTED:

Dean, B.J., "Aviation Selection Testing: The Effect of Minimum Scores on Minorities," Master's Thesis, Naval Postgraduate School, March 1996.

Bautista, G.E., "Surface Warfare Junior Officer Separation: Does Ship Type Make a Difference?" Master's Thesis, Naval Postgraduate School, March 1996.

Flatter, J.R., "First-Term Attrition Due to Pregnancy in the Marine Corps: Issues, Trends, and Options," Master's Thesis, Naval Postgraduate School, March 1996.

Grillo, M.A., "A Study of Promotion to Major in the Marine Corps," Master's Thesis, Naval Postgraduate School, June 1996.

### DoD KEY TECHNOLOGY AREAS: Manpower, Personnel and Training

**KEYWORDS:** Minority officers, promotion, equal opportunity, retention, commissioning sources, force management, population representation, diversity

### SYSTEMS MANAGEMENT RESEARCH SUPPORT FOR THE RAPID ACQUISITION OF MANUFACTURED PARTS (RAMP) PROGRAM

K.J. Euske, Professor

A.W. McMasters, Professor Emeritus

Department of Systems Management

Sponsor: Naval Supply Systems Command

**OBJECTIVE:** A continuing project to develop, test and facilitate implementation of a Best Value Model for RAMP facilities.

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**SUMMARY:** Discussions with the Rapid Acquisition of Manufactured Parts (RAMP) Program Office indicated that the previously developed (by NPS) Best Value spreadsheet model for deciding between vendors' bids for consumable items based on both unit cost and production lead time needed to be extended to the case of repairable items. The repairable model recently developed on another NAVSUP project was proposed. The equation for the expected total annual variable costs to manage the inventory of a repairable item was derived and can be used to determine the Best Value vendor to select. Work is underway to extend that model to include the limiting case where demand is so large that it should be modeled by the Normal distribution rather than the Poisson.

**DoD KEY TECHNOLOGY AREAS:** Modeling and Simulation

**KEYWORDS:** Acquisition management, computer integrated manufacturing, inventory management

### INDIVIDUAL FIRM STRATEGIC CHANGE

**Jane Feitler, Visiting Assistant Professor**

**Department of Systems Management**

**Sponsor: Naval Postgraduate School**

**OBJECTIVE:** The objective of this project is to extend a model of strategic change to investigate the types of specific strategic changes firms made over time and the performance implications of the decision to change or not change strategies over time. This project is a continuation of work begun in 1995.

**SUMMARY:** This continuing research further extends and investigates strategic changes found in the U.S. Motor Carrier industry's Less Than Truckload (LTL) segment. Applications of what firms did over an eighteen year time span (1976-1993) provides insight as to what strategic change actions managers are more likely to make when faced with external and internal changes, as well as the performance implications of those strategic actions. A set of managerial strategic changes that can be utilized by firms in the transportation sector was identified. The set of changes and their relationship to performance outcomes was also identified. Using a longitudinal data base, it was found that those firms that changed on one or more strategic dimensions and that evidenced prior poor performance, reaped positive performance benefits one and two years after the strategic change. Further analysis will be done to determine what specific types of changes brought about performance benefits.

**DoD KEY TECHNOLOGY AREAS:** Other (Strategic Change)

**KEYWORDS:** Strategic change, performance, transportation

### LAYOUT AND DESIGN OF FREIGHT TERMINALS

**Kevin R. Gue, Visiting Assistant Professor**

**Department of Systems Management**

**Sponsor: Naval Postgraduate School**

**OBJECTIVE:** To investigate problems in the layout and design of freight terminals for the less-than-truckload (LTL) motor carrier industry. The project includes two phases of research: (1) investigate methods for creating and exploiting freight flow patterns in incoming trailers, and (2) demonstrate how the shape of a terminal affects its efficiency and give suggestions for designing large terminals.

**SUMMARY:** Regarding the exploitation of freight flow patterns in incoming trailers, focus was on modeling the material flows in a terminal when supervisors schedule incoming trailers into doors based on the destinations of the shipments inside. It was conjectured that the flows would be altered such that the layout should change to exploit the supervisor's scheduling policy. Surprisingly, this is not the case! Experiments using data from a large LTL carrier indicate that, for the test site, the layout of the terminal need not change to exploit the scheduling policy of a supervisor; that is, terminal managers can use a simple flow model based on "average flows" and capture nearly all of the savings

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resulting from the scheduling policy. This suggests that the average-flow model used in our previous work is more robust than expected.

### CONFERENCE PRESENTATIONS:

Gue, Kevin R., and Bartholdi, John J., "Balancing Travel Cost and Congestion in an LTL Freight Terminal," Conference of the Institute for Operations Research and Management Sciences, Washington, DC, 28 April 1996.

Gue, Kevin R., and Bartholdi, John J., "The Effects of Scheduling on the Layout of a Freight Terminal," Conference of the Institute for Operations Research and Management Sciences, Atlanta, GA, 3 November 1996.

**DoD TECHNOLOGY AREAS:** Other

**KEYWORDS:** Less-than-truckload (LTL) Motor Carrier, freight flow patterns

### CONCEPTUALIZING AND OPERATIONALIZING DOMINANT BATTLEFIELD AWARENESS

**Gregory G. Hildebrandt, Associate Professor**

**Department of Systems Management**

**Sponsor: Naval Postgraduate School-Institute for Joint Warfare Analysis**

**OBJECTIVE:** The purpose of this research is to understand the conceptual aspects of dominant battlefield awareness (DBA). Using modern decision theory under conditions of asymmetric information, the joint warfighting aspects of this concept are explored. This includes the use of DBA as an analytical construct, a programming goal, and as base case.

**SUMMARY:** An operational definition of Dominant Battlefield Awareness was developed in this research. Using a CVBG Air Defense Problem, a game against "nature" was analyzed in which one F-14 is available to be employed against a possible enemy strike. The problem is complicated by the fact that friendly forces may also be returning from missions. An indicator is also available which permits Bayes' Theorem to be used to develop the optimal decision rule. The analysis was generalized to include several indicators and the probable availability of an additional F-14. The value of information is shown to increase, but at a decreasing rate. The trade-off between information and forces was also analyzed. The analysis was extended to address the case of a reactive enemy, and the Bayesian equilibrium was determined.

### PUBLICATION:

Hildebrandt, G. and Franck, R.E., "A Bayesian Perspective of Dominant Battlefield Awareness," Sixty-third Military Operations Research Symposium Proceedings, April 1996.

### CONFERENCE PRESENTATION:

Hildebrandt, G., "Resource Implications of Joint Force Packages," Western Economics Association Convention, San Francisco, CA, July 1996.

**DoD KEY TECHNOLOGY AREAS:** Human Systems Interface

**KEYWORDS:** Operating and support cost, recapitalization, joint force packages, reconnaissance-strike

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### ESTIMATING THE OPERATING AND SUPPORT COST OF JOINT FORCE PACKAGES

Gregory G. Hildebrandt, Associate Professor

Department of Systems Management

Sponsor: Naval Postgraduate School-Institute for Joint Warfare Analysis

**OBJECTIVE:** The objective of this project is to provide recommendations as to how operating and support (O&S) cost estimates that are consistent across services can be used in the analysis of joint force structure and cost alternatives. Based on this analysis, the O&S costs of specified Joint Force Packages are to be determined.

**SUMMARY:** The analysis determined that the Defense Resource Model included a budget-based costing framework that permits comparable O&S costs to be estimated across services, and that this model is an appropriate tool for estimating the O&S costs of Joint Force Packages. A methodology was also developed for estimating the recapitalization cost of the Packages. Using the DRM model and the developed methodology, O&S and recapitalization costs were estimated for Air-Sea, Air-Land, and Air-Land-Sea Joint Force Packages. A distinctive feature of the analysis is that account was taken of both direct and indirect O&S costs. Therefore, in addition to the direct costs of the forces contained in the Joint Force Packages, the indirect O&S costs for base operating and support (BOS), logistics (including depot maintenance and overhaul), training and other support activities were estimated. A method was also developed for determining the proportion of the indirect O&S costs remaining fixed when force structure changes. This technique is particularly helpful when estimating the costs associated with large changes in force structure.

**DoD KEY TECHNOLOGY AREAS:** Other (Cost Analysis)

**KEYWORDS:** Dominant battlefield awareness, value of information, Bayesian equilibrium

### ASSESSMENT OF EMPLOYEE ATTITUDES AT NAVAL AIR WARFARE CENTER-AIRCRAFT DIVISION, INDIANAPOLIS (NAWC-ADI) AFTER THE BRAC CLOSURE DECISION

Susan Page Hocevar, Assistant Professor

Department of Systems Management

Sponsor: Naval Air Warfare Center-Aircraft Division

**OBJECTIVE:** In 1995, NAWC-ADI was named for closure by the BRAC Commission. This study assessed employee preferences for various future employment options, attitudes regarding organizational effectiveness and morale.

**SUMMARY:** This research was conducted to provide data to assist senior leaders at Naval Air Warfare Center, Aircraft Division, Indianapolis, as they planned strategies for implementing the decision to close the facility. There were two main components of the survey designed. The first assessed employee preferences for federal versus private sector employment, preferences among NAVAIR facilities for geographic relocation, and confidence in finding future employment. The second component assessed employee perceptions about aspects of organizational performance that had been the focus of a significant change effort at NAWC-ADI over the past four years. Taking questions from surveys used in prior research studies, trends were measured in areas such as: teamwork, empowerment, innovation, communication. The survey was administered to over 1600 personnel representing over 80% of the total population. The data were analyzed for the total sample, as well as subgroupings (e.g., wage grade versus professional). The results of the longitudinal comparisons of perceptions of organizational effectiveness showed a continuing improvement in perceptions of customer focus, quality service to customers, efficiency of work. Decreases were found in ratings of management truthfulness, support for innovation and cooperation, and commitment to the organization.

#### PUBLICATION:

Hocevar, S.P., "Summary of Employee Attitude Survey Results Following BRAC Decision," NPS Project Report.

## PROJECT SUMMARIES

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**DoD KEY TECHNOLOGY AREAS:** Other (Organizational Change)

**KEYWORDS:** Employee attitudes, base closure, quality of work life

### **LARGE SCALE CHANGE IN TWO DoN ORGANIZATIONS**

**Susan Page Hocevar, Assistant Professor**

**Department of Systems Management**

**Sponsor: Naval Postgraduate School**

**OBJECTIVE:** To identify potentially generalizable conclusions regarding the implementation of Large Scale Change in DoD organizations based on research conducted with Naval Air Warfare Center, Aircraft Division, Indianapolis (NAWC-ADI) and Military Sealift Command (MSC).

**SUMMARY:** Work during the current year has included initiating a literature search in two major areas: 1) organizational and individual strategies for dealing with job loss; 2) the role of culture in organizational change and organizational effectiveness. This first provides the context for analyzing the most recent aspect of change facing NAWC-ADI after having been named for closure by BRAC. The second focuses on the Competing Values model for assessing organizational culture.

Additionally, a project has been initiated to extend the current database on MSC culture and values to include the perspectives of civilian mariners. This work builds on the Bellavioire thesis.

**DoD KEY TECHNOLOGY AREAS:** Other (Organizational Effectiveness)

**KEYWORDS:** Organizational change, organizational culture, quality of work life, BRAC

### **NAVAL POSTGRADUATE SCHOOL SUPPORT FOR MILITARY SEALIFT COMMAND REINVENTION EFFORTS**

**Susan Page Hocevar, Assistant Professor**

**Department of Systems Management**

**Sponsor: Military Sealift Command**

**OBJECTIVE:** This research continued support for MSC reinvention started in FY 95. The goal of this sub-project was to assist MSC to identify the role of organizational culture in organizational effectiveness, to define core values aligned with the organization's vision, and to assess the current culture and needs for change.

**SUMMARY:** During this project year, the action research on the role of organizational culture in MSC's reinvention efforts was carried out in three phases:

1) Interview data were gathered and analyzed from three organizational levels (Headquarters, Area Command, Field Command) to identify values and behaviors evident in specific events when high quality performance was achieved as well as specific behaviors, policies, norms, that interfered with MSC performing at its best. The results of this research were presented at a 2-day workshop with approximately 30 of MSC's most senior managers. The product developed at this meeting was a preliminary statement of core organizational values.

2) Based on the data gathered in phase 1 as well as the current research literature on organizational culture and effectiveness, a questionnaire survey was designed, pilot tested and revised. The survey was administered to a stratified random sample of shore-based personnel. Results were analyzed and summarized.

3) A 2-day workshop was designed and delivered. The workshop achieved two objectives. First a briefing of the research results was presented to an audience of approximately 35 senior managers and 15 mid-level managers at MSC headquarters. Second, action planning to improve alignment of existing with desired culture and values was initiated with NPS facilitation of MSC teams comprised of mid-level managers from Headquarters and Area Commands.

## PROJECT SUMMARIES

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### THESES DIRECTED:

Bellafiore, A.E., "The Reinvention of Military Sealift Command: The Civilian Mariner Perspective," Master's Thesis, Naval Postgraduate School, March 1996.

Fuller, R.S., "Modified Benchmarking Study of Program Management Within a Matrix Structure," Master's Thesis, Naval Postgraduate School, March 1996.

Jung, J.D., "Performance Measures for Military Sealift Command's Special Mission Oceanographic Ships," Master's Thesis, Naval Postgraduate School, June 1996.

Merritt, M.A., "An Evaluation of Organizational Culture at the Military Sealift Command," Master's Thesis, Naval Postgraduate School, June 1996.

Whatley, S.L., "Centralization or Decentralization? A Case Study of the Military Sealift Command's Special Mission Program," Master's Thesis, Naval Postgraduate School, March 1996.

**DoD KEY TECHNOLOGY AREAS:** Other (Organizational Effectiveness)

**KEYWORDS:** Organizational culture, organizational change, values, reinvention, re-engineering

**IMPACT OF THE CHIEF FINANCIAL OFFICER'S (CFOA) AND  
GOVERNMENT PERFORMANCE AND RESULTS ACT (GPRA) ON  
DOD AND DOD FINANCIAL MANAGEMENT EDUCATION ASSESSMENT**  
L.R. Jones, Professor  
Department of Systems Management  
Sponsor: DoD Comptroller

**OBJECTIVE:** The goal of this project was to assess the impact of the Chief Financial Officer's Act and the Government Performance and Results Act and other financial management legislation on the DoD, and to assist in development of DoD Financial Management Education and Training.

**SUMMARY:** Research was performed to assess financial management reforms and education and trainings. Data were analyzed in terms of the roles of the participants and their relationships. The system for implementation of reforms was analyzed for methods and alternatives to improve efficiency and cost-effectiveness. Preliminary results were presented to the sponsor and feedback was obtained on approaches to further analysis. The climate and characteristics of reform were assessed with the aid of the sponsor to assist in the design of further research. An assessment of DoD Financial Management Education and Training was conducted and reported to the DoD Comptroller staff.

### PUBLICATIONS:

Jones, L.R., "PPBS," The International Encyclopedia of Public Policy and Administration, J. Shafritz, ed., (New York, NY: Holt Publishers, 1996).

McCaffery, Jerry L. "The Chief Financial Officer," The International Encyclopedia of Public Policy and Administration, J. Shafritz, ed., (New York, NY: Holt Publishers, 1996).

Johansen, C., Jones, L.R., and Thompson, F., "Management and Budget Control," Handbook of Financial Management and Budgeting, J. Rabin and R. Golembiewski, eds., (New York: Marcel-Dekker, 1996).

Jones, L.R., "PPBS," The International Encyclopedia of Public Policy and Administration, J. Shafritz, ed., (New York, NY: Holt Publishers, 1996).

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Jones, L.R., Strategic Budgeting," The International Encyclopedia of Public Policy and Administration, J. Shafritz, ed., (New York, NY: Holt Publishers, 1996).

Jones, L.R., "Budget Control," The International Encyclopedia of Public Policy and Administration, J. Shafritz, ed., (New York, NY: Holt Publishers, 1996).

### PRESENTATION:

Jones, L.R., "The Five Rs of the New Public Management," Conference of the International Public Management Network, St. Gallen, Switzerland, 9 July 1996.

**DoD KEY TECHNOLOGY AREAS:** Other (Financial Management)

**KEYWORDS:** Chief Financial Officer's Act (CFOA), Government Performance and Reform Act (GPRA), financial management

### NAVY FLIER AND FLIGHT HOUR BUDGETING AND IMPACT OF BUDGET REDUCTIONS

L.R. Jones, Professor

Jerry L. McCaffery, Professor

Department of Systems Management

Sponsor: Naval Air Systems Command-Pacific

**OBJECTIVE:** The goal of this project was to assess the budget and the impact of budget reductions in the AIRPAC, PACFLT command, and to assess management control system and accounting changes to respond to budget austerity.

**SUMMARY:** Research was performed in the field, in AIRPAC HQ and at installations to assess the characteristics of budget and accounting systems. These systems were analyzed in terms of the roles of the participants and their relationships in budget preparation, analysis and justification. The budget preparation system was analyzed for methods and alternatives to improve efficiency and cost-effectiveness. Preliminary results were presented to the sponsor and feedback was obtained on approaches to further analysis. The climate and characteristics of the POM and budget preparation were assessed with the assistance of the sponsor to assist in the design of further research. Analysis of the Flight Hour Program also was performed.

### PUBLICATIONS:

Johansen, C., Jones, L.R., and Thompson, F., "Management and Budget Control," Handbook of Financial Management and Budgeting, J. Rabin and R. Golembiewski, ed., (New York: Marcel-Dekker, 1996).

Jones, L.R., Strategic Budgeting," The International Encyclopedia of Public Policy and Administration, J. Shafritz, ed., (New York, NY: Holt Publishers, 1996).

Jones, L.R., "Budget Control," The International Encyclopedia of Public Policy and Administration, J. Shafritz, ed., (New York, NY: Holt Publishers, 1996).

McCaffery, J.L., "Revenue Budgeting," The International Encyclopedia of Public Policy and Administration, J. Shafritz, ed., (New York, NY: Holt Publishers, 1996).

McCaffery, J.L., "Program Budgeting," The International Encyclopedia of Public Policy and Administration, J. Shafritz, ed., (New York, NY: Holt Publishers, 1996).

McCaffery, J.L., "Budgeting," The International Encyclopedia of Public Policy and Administration, J. Shafritz, ed., (New York, NY: Holt Publishers, 1996).

## PROJECT SUMMARIES

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McCaffery, J.L., and Wolfgang, Donald, "Performance Budgeting," The International Encyclopedia of Public Policy and Administration, J. Shafritz, ed., (New York, NY: Holt Publishers, 1996).

### CONFERENCE PRESENTATIONS:

Jones, L.R., "The Five Rs of the New Public Management," Conference of the International Public Management Network, St. Gallen, Switzerland, 9 July 1996

### THESES DIRECTED:

Kirkham, Christopher, "Mission Competition and Resource Allocation in the DoD and DoN," Master's Thesis, Naval Postgraduate School, June 1996.

Mitchell, Marquita and John Pasch, "Analysis of Regional Consolidation of Aircraft Maintenance and Repair," Master's Thesis, Naval Postgraduate School, December 1996.

Simcik, Thomas "Reengineering PPBS in the Navy," Master's Thesis, Naval Postgraduate School, December 1996.

Smith, Robert "An Analysis of the Atlantic Fleet Performance Measurement Project," Master's Thesis, Naval Postgraduate School, December 1996.

Salazar, Gabriel "The Role of the CINCs in the Budget Process," Master's Thesis, Naval Postgraduate School, June 1996.

**DoD KEY TECHNOLOGY AREAS:** Other (Financial Management)

**KEYWORDS:** POM, Flight Hour Program, budget

### ANALYSIS AND DESIGN OF A CONTEMPORARY MARINE CORPS INSTITUTE AUTOMATED INFORMATION SYSTEMS

Magdi N. Kamel, Associate Professor

Department of Systems Management

Sponsor: U.S. Marine Corps Institute

**OBJECTIVE:** The objective of this research project is to support the Marine Corps Institute in transforming their current legacy information system into a modern environment that can take advantage of "open" technology

**SUMMARY:** This research completed the following tasks:

- 1) Developing a data model to support the student services function using IDEF1X modeling.
- 2) Developing an AS IS business model of the student services functions using IDEF0 modeling.
- 3) Developing a modern technology architecture that supports client/server, relational databases, and open systems computing.
- 4) Investigating different user interface design approaches to incorporate in a proof-of-concept prototype.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software

**KEYWORDS:** System development, client/server computing, open system, database management systems

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### A COMPARATIVE STUDY OF DOCUMENT WORKFLOW MANAGER APPLICATIONS

Magdi N. Kamel, Associate Professor

Department of Systems Management

Martin J. McCaffrey, Visiting Assistant Professor

Institute of Defense Education and Analysis

Sponsor: Naval Surface Warfare Center-Port Hueneme Division

**OBJECTIVE:** The objective of this project is to perform a comparative analysis of Commercial Off-The-Shelf (COTS) workflow products to support the integration of Port Hueneme Division, (PHD) Naval Surface Warfare Center (NSWC), workflow requirements into the Integrated Data Management System (IDMS) centralized on-line Technical Data Management System. A related objective of the project is to look into methodologies for Business Process Improvement (BPI), workflow automation, and the relationship between the two.

**SUMMARY:** The effort for the current reporting period included completing the following tasks:

- 1) Conducting a detailed study of Business Process Improvement Methodologies.
- 2) Investigating workflow automation approaches and related technologies.
- 3) Developing and refining a methodology for using workflow technology to improve current business processes and applying the methodology to improve the technical manual changes process at Port Hueneme Division of the Naval Surface Warfare Center.

#### PUBLICATIONS:

Bitzer, S., and Kamel, M.N., "Improving Business Processes Through the Use of the Workflow Reengineering Methodology," in Proceedings of the Second Americas Conference on Information Systems, Phoenix, AZ, August 1996.

#### CONFERENCE PRESENTATION:

Bitzer, S., and Kamel, M.N., "Improving Business Processes Through the Use of the Workflow Reengineering Methodology," Second Americas Conference on Information Systems, Phoenix, AZ, August 1996.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software

**KEYWORDS:** Document management, business process analysis, business process re-engineering, workflow automation, workflow software

### DESIGN AND IMPLEMENTATION OF A PROTOTYPE MAINTENANCE ADVISOR EXPERT SYSTEM FOR THE MK92 FIRE CONTROL SYSTEM

Magdi N. Kamel, Associate Professor

Department of Systems Management

Martin J. McCaffrey, Visiting Assistant Professor

Institute of Defense Education and Analysis

Sponsor: Naval Surface Warfare Center-Port Hueneme Division

**OBJECTIVE:** This effort is part of a continuing project whose objective is to develop a prototype maintenance advisor expert system for the MK92 Fire Control System to enhance the ability of MK92 technicians to better determine, diagnose, and resolve problems within the system.

**SUMMARY:** The effort for the current reporting period included the following tasks:

- 1) Revising, refining, and expanding expert knowledge procedures, developed in an earlier effort, for both performance and calibration portion of the Daily System Operability Test (DSOT).
- 2) Designing and implementing the expert procedures for the calibration and performance modules using an expert system shell.

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- 3) Conducting testing, validation, and verification on the implemented procedures.
- 4) Developing a configuration management plan to assist the project development team in managing changes to software and domain knowledge.
- 5) Fielding an initial prototype of the performance and calibration modules and collecting users feedback.

### PUBLICATION:

Kamel, M.N., McCaffrey, M.J., and Metzler, P.G., "Analysis, Design, Implementation, and Deployment of a Prototype Maintenance Advisor Expert System for the MK92 Fire Control System," *Expert Systems With Applications*, Vol. 10, No. 2, 1996, pp. 193-207.

### THESES DIRECTED:

Leonard, T.J., "MK 92 MOD 2 Fire Control System Maintenance Advisor Expert System: Implementation and Deployment," Master's Thesis, Naval Postgraduate School, September 1996.

Cepek, R.J., "Implementation Issues for the Initial Deployment of the Performance and Calibration Modules of the MK 92 MOD 2 Fire Control System Maintenance Advisor Expert System," Master's Thesis, Naval Postgraduate School, December 1996.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software

**KEYWORDS:** Expert systems, knowledge acquisition, knowledge representation

### AN INFORMATION ARCHITECTURE FOR A UNIFIED VIEW OF PORTS AND AIRFIELDS DATA FOR THE JOINT MARITIME COMMAND INFORMATION SYSTEM

Magdi N. Kamel, Associate Professor

Department of Systems Management

Sponsor: Naval Postgraduate School-Institute of Joint Warfare Analysis

**OBJECTIVE:** The objective of this project is to investigate alternative architectures to construct a unified view of ports and airfields data that are represented differently in different systems developed by different organizations. This architecture is crucial for the development of a common operating environment for the Joint Maritime Command Information System (JMCIS).

**SUMMARY:** This research completed the following tasks:

- 1) Examination of database integration approaches and efforts.
- 2) Development of a methodology for identifying, classifying, and resolving semantic conflicts.
- 3) Enumerating alternative approaches for integrating data from different sources and evaluating the pros and cons of each alternative.

### PUBLICATIONS:

Kamel, M.N., "A Methodology for Identifying an Integrating Strategy and Architecture for Heterogeneous Databases in a Distributed Environment," in *Proceedings of the Thirteenth Annual Department of Defense Database Colloquium, Database'96*, San Diego, CA, August 1996, pp. 555-571.

### CONFERENCE PRESENTATION:

Kamel, M.N., "A Methodology for Identifying an Integrating Strategy and Architecture for Heterogeneous Databases in a Distributed Environment," *Thirteenth Annual Department of Defense Database Colloquium, Database'96*, San Diego, CA, August 1996.

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**DoD KEY TECHNOLOGY AREAS:** Computing and Software

**KEYWORDS:** Database integration, federated database systems, data warehouses

### **DATABASE, NETWORK, AND OPERATIONAL ANALYSES FOR THE TOMAHAWK ENGINEERING 2000 PROJECT**

**Magdi N. Kamel, Associate Professor**

**Department of Systems Management**

**Martin J. McCaffrey, Visiting Assistant Professor**

**Institute for Defense Education and Analysis**

**Sponsor: Naval Surface Warfare Center-Port Hueneme Division**

**OBJECTIVE:** The objective of this project is to provide the detailed analysis needed to design and create an open, integrated, system for the Tomahawk community. Specifically, the effort performs three separate tasks: database analysis, network analysis, and operational analysis.

**SUMMARY:** The effort for the reporting period focused on network and operational analyses. It specifically completed the following tasks:

- 1) Evaluating the current Engineering 2000 baseline network architecture.
- 2) Defining the Engineering 2000 target network architecture.
- 3) Developing a plan for migrating the current to the desirable target network architecture.
- 4) Evaluating the current Engineering 2000 baseline Information Systems Security (ISS) management state.
- 5) Developing an Information Systems Security model and methodology for its implementation.
- 6) Applying the developed model to formulate an Engineering 2000 target Information Systems Security management state.
- 7) Developing a list of recommendations to bridge the gap between the baseline and target states.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software

**KEYWORDS:** Database analysis, network analysis, operational analysis

### **SYSTEMS ACQUISITION MANAGEMENT SUPPORT**

**D.V. Lamm, Associate Professor**

**Department of Systems Management**

**Sponsor: Assistant Secretary of the Army (RD&A)**

**OBJECTIVE:** The Military Deputy to the Assistant Secretary of the Army (Research, Development & Acquisition) is the sponsor of the Systems Acquisition Management (816) curriculum at NPS. This funding supports Army thesis students (military and civilian) in the 816 curriculum, an acquisition library and librarian, faculty travel for development purposes, and the academic associate.

**SUMMARY:** The objective of the 816 curriculum is to provide selected officers and Government civilians an advanced education in the fundamental concepts, methodologies, and analytical techniques necessary for the management of major defense systems. The curriculum is open to both U.S. students and officers/civilians of Allied nations. The curriculum is six quarters for Army officers and seven quarters for all others. A key feature of this program is its relationship with the requirements of the Defense Acquisition Workforce Improvement Act (DAWIA) which statutorily requires mandatory training in various career fields. The most significant of these requirements is the Advanced Program Management Course (PMT302) sponsored by the Defense Systems Management College(DSMC). The NPS 816 curriculum is the only program in the country which has satisfied comparability requirements for PMT 302, a Level III (Executive Level) Program Management course. The 816 curriculum also satisfies requirements through

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Level III in Test and Evaluation (T&E) Engineering and Level II (Intermediate Level) in Systems Planning, Research, Development and Systems Engineering (SPRDE). Efforts are underway to obtain equivalency in the following areas: Level II in Manufacturing, Production and Quality Assurance (PQM); Level II in Software Acquisition Management (SAM); Level III in Acquisition Logistics (LOG); and Level II in Business, Cost Estimating, Financial Management (BCEFM).

### PUBLICATION:

Lamm, David V., "Acquisition Education at the Naval Postgraduate School," Army Research Development and Acquisition (RD&A), July-August 1996, pp. 24-27

### CONFERENCE PRESENTATIONS:

Lamm, David V., "Past Performance in Contracting," National Contract Management Association, Ridgecrest, CA, 20 January 1996

Lamm, David V., "Using Past Performance Measures in Source Selection," National Contract Management Association, Sunnyvale, CA, 13 February 1996.

Lamm, David V., "Major Changes in Government Contracting," FY1997 Marine Corps Contracting Officers' Conference, Kansas City, KS, 21-23 October 1996.

**DoD KEY TECHNOLOGY AREAS:** Other (Systems Acquisition)

**KEYWORDS:** Acquisition, program management, test and evaluation, systems engineering, contracting, logistics, manufacturing/production

### COST EFFECTIVENESS ANALYSIS OF THE NAVAL AIRCRAFT ENGINE COMPONENT IMPROVEMENT PROGRAM

A.W. McMasters, Professor Emeritus

Department of Systems Management

Sponsor: Naval Air Systems Command

**OBJECTIVE:** A continuing project to develop models to predict the savings in life-cycle costs of proposed engineering changes intended to improve reliability, maintainability, and sustainability of turbine aircraft engines for Naval aircraft.

**SUMMARY:** An important element of aircraft logistical support is the aircraft engine Component Improvement Program (CIP). The CIP is essential for the continuing evolution of these engines. This project is looking for ways to justify that program. The first phase was to examine the current life-cycle cost models used by the Air Force and the Navy which are intended to show the expected savings from a specific proposed component improvement. NPS' evaluation of the Air Force's Cost Effectiveness Analysis Model (CEAMOD) resulted in its adoption by the Navy's in May 1993. The second phase was to validate the actual costs and logistics effectiveness of the CIP by looking at historical data. That may also suggest ideas for an improved model. A third phase addressed the problem of justifying warranties on aircraft engines. Finally, a fourth phase has been to determine ways of setting reasonable reliability goals for fielded engines.

A comprehensive procedures manual for Version 3.0 of the CEAMOD was developed this past year. It provides a detailed analysis of the Excel spreadsheet calculations as well as a detailed description of each worksheet. In the process of developing this manual, two significant and ten minor errors were discovered. These need to be corrected on the next version of the CEAMOD.

As part of the study of ways to set reliability goals, a procedure was developed this past year for computing component optimal no-build times. The no-build time for a critical component with hard inspection time (HT), T0, is the

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smallest accumulated operating time above which an engine under repair should not be rebuilt without first inspecting/repairing the critical component. For example, a component with HT of 1,000 hours may have been assigned a no-build time of 850 hours. If so, any time the engine is off wing under repair for some reason and the accumulated operating time on the component is greater than 850 hours, the critical component is also inspected/repaired during the engine repair.

An integral optimizing equation was developed that can be used to compute optimal no-build times relative to given hard inspection times. The optimal no-build time yields the smallest average repair cost per operating hour for the critical component: The two ratios C2/C1 and C3/C1 must be known to use the optimizing equation. C1 is the cost of component inspection/repair when the engine is already off the engine. C2 is the cost of component inspection/repair at T0 when started with the engine still on-wing. C3 is the cost of component inspection when it fails. Parameters of the engine time between failure probability distribution and critical component time between failure probability distributions must also be known to use the optimizing equation. Data from the NALDA data base for the TF34 engine was used to illustrate the use of the model.

### THESES DIRECTED:

Mifsud, M., "A User's Manual for the Cost Effectiveness Analysis Model(CEAMOD) Version 3.0," Master's Thesis, Naval Postgraduate School, September 1996.

Mlikan, M.E., "Methods For Determining Performance Expectations and Optimal No-Build Times of Fielded Jet Engines," Master's Thesis, Naval Postgraduate School, June 1996.

### DoD KEY TECHNOLOGY AREAS: Modeling and Simulation

**KEYWORDS:** Naval aircraft engines, Component Improvement Program (CIP), cost/benefit analysis, aircraft engine warranties, reliability assessment

### NAVY AND DEFENSE INVENTORY MANAGEMENT TEXTBOOK

A.W. McMasters, Professor Emeritus  
Department of Systems Management  
T.P. Moore, Research Assistant Professor  
Institute for Defense Education and Analysis  
Sponsor: Naval Supply Systems Command

**OBJECTIVE:** This continuing research project involves the research and writing of Chapters 1-6 and 8 of a textbook called Navy and Defense Inventory Management. This textbook will replace NAVSUP Publication 553, Inventory Management,, published in 1983. The textbook will be used in two graduate courses in the Systems Management Department at the Naval Postgraduate School and as a reference document by Navy and other supply system personnel. These chapters of the textbook include an introduction to military inventory management; an overview of inventory theory; descriptions of wholesale and retail provisioning processes in the Navy; descriptions of wholesale and retail requirements determination and management processes in the Navy Supply System; and an overview of Navy inventory management outside of the Navy Supply System.

**SUMMARY:** Work is continuing on this project. Detailed outlines of the chapters have been examined by personnel at the Naval Supply Systems Command and the Naval Inventory Control Point. No changes have been recommended. Most of Chapters 1 and 2 have been completed, and substantial research has been done on the material for Chapters 3, 4, 5, and 6. An introductory scenario for Chapter 1 that is intended to illustrate both the uniqueness of military inventories and the importance to the Navy of good inventory management practices was developed. However, comments from Supply Corps officers studying at NPS indicate that significant revision of this introductory scenario is required to improve its effectiveness.

## PROJECT SUMMARIES

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**DoD KEY TECHNOLOGY AREAS:** Modeling and Simulation

**KEY WORDS:** Inventory management, Navy Supply System, defense logistics

### **READINESS-BASED SPARING REPLENISHMENT MODEL FOR REPAIRABLE ITEMS**

**A.W. McMasters, Professor Emeritus**

**Department of Systems Management**

**Sponsor: Naval Supply Systems Command**

**OBJECTIVE:** A continuing project to develop a wholesale level inventory model for the Navy's Inventory Control Points to use to replenish their inventories of repairable items; the objective function of this model should be related to readiness.

**SUMMARY:** A new inventory model for managing repairables at the wholesale level is needed to determine when to replenish repairable items associated with a specific weapon system. This model should have the same objective function as the wholesale provisioning (or first buy quantity) model developed on this project between 1982 and 1986; namely, the minimization of the aggregate Mean Supply Response Time (MSRT). Recent simulation analyses have resulted in an approximate model for describing the inventory position and the net inventory at any instant of time as a function of the order quantity, repair quantity, and the maximum level of the inventory position under the assumption of Poisson demand for a given repairable item. From this model formulas for the expected time-weighted backorders and the probability of being out of stock at any instant of time have been derived.

This past year formulas for inventory position and net inventory were developed for the limiting case of demand being continuous with a Normal distribution which has the same mean and variance as the Poisson. In addition, the Poisson model was run for a variety of values of the order and repair quantities to see how closely the formulas used currently by the Navy for these quantities compare to optimal values of them in the sense of minimizing the total annual expected variable costs obtained from the model.

**DoD KEY TECHNOLOGY AREAS:** Modeling and Simulation

**KEY WORDS:** Inventory management, Navy repairable items, inventory model

### **A COST-BENEFIT ANALYSIS OF THE NAVY'S DRUG TESTING PROGRAM**

**Stephen L. Mehay, Professor**

**Department of Systems Management**

**Sponsor: Navy Personnel Research and Development Center**

**OBJECTIVE:** The goal of this project was to use the conceptual model for determining an optimal drug testing strategy in the first phase of the project in fiscal year 1995 to estimate a cost benefit analysis of the Navy's drug testing program.

**SUMMARY:** The objective of this effort is to identify the benefits of the Navy's drug testing program. The research identified both a deterrent and a detection effect of drug testing. An attempt was made to determine the size of each of these effects Navywide at alternative drug testing rates. The objectives for the drug testing program and the methodology for defining costs and benefits of the program were developed in the first phase of the project in fiscal year 1995. The model considers such issues as detection, deterrence, relevant probabilistic models, and potential gaming by personnel. Statistical estimates of both the deterrence and detection effects were developed. The detection effect depended on the gaming characteristics of the affected personnel. The deterrence effects were based on differences between actual Navy drug use rates and predicted rates based on the civilian population. These effects were valued in terms of the cost savings to the Navy from the reduced drug use. These benefits were compared to the costs of the urinalysis

## PROJECT SUMMARIES

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program at alternative testing rates. The analysis also conducted a sensitivity analysis and concluded the Navy's drug testing program generated positive net benefits at current testing rates.

### PUBLICATIONS:

Borack, J., and Mehay, S., "A Conceptual Model for Determining an Optimal Drug Testing Program," Technical Report TR-96-5, Navy Personnel Research and Development Center, San Diego, CA, January 1996.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Drug kinetics, drug testing, optimal drug policy, urinalysis strategies, cost-benefit analysis

### MANPOWER, TRAINING AND ACQUISITION FACULTY RESEARCH TO SUPPORT CHIEF OF NAVAL PERSONNEL

Stephen L. Mehay, Professor  
Department of Systems Management  
Sponsor: Chief of Naval Personnel

**OBJECTIVE:** The project provided umbrella funding within which individual projects were proposed and carried out by individual researchers. Mehay coordinated the overall project and facilitated interactions between MPT faculty, thesis students, and N1/BUPERS.

**SUMMARY:** The efforts under this umbrella project focused on modeling the retention behavior of both officers. One task involved collecting data to forecast the retention of Naval aviators in the normal window during which losses are the greatest. This window lasts from the period when the minimum service requirement expires (MSR) to about 3 years past the initial expiration. This effort provided a simple spreadsheet model for developing the projected continuation rates. A second task involved construction an annualized cost of leaving model (ACOL) to use to model the effect of monetary bonuses on aviator retention. Finally, a third ACOL model was constructed and used to simulate the effect of the VSI/SSB separation bonus program in inducing separation. Finally, the program continued earlier efforts to model the effect of graduate education of officers on subsequent performance.

### CONFERENCE PRESENTATIONS:

Mehay, Stephen L., and Hoga, Paul F., "The Effect of Separation Bonuses on Voluntary Quits: Evidence from a Structural Model," Western Economic Association Annual Meetings, San Francisco, CA, July 1996.

Mehay, S.L., and Bowman, W.R., "Human Capital and Productivity in Hierarchical Organizations: Evidence from Military Personnel," Western Economic Association Annual Meetings, San Francisco, CA, July 1996.

Mehay, S.L., and Bowman, W.R., "Graduate Education and On-the-Job Productivity" Labor Economics Seminar at the University of MD, April 1996.

Bowman, W.R., and Mehay, S.L., "Career Advancement of Minority Officers in the U.S. Military," Western Economic Association Annual Meetings, San Francisco, CA, July 1996.

### THESES DIRECTED:

Couglin, Matthew, "Development of a Forecasting Model of Naval Aviator Retention Rates," Master's Thesis, Naval Postgraduate School, March 1996.

Fuchs, Kimberly, "The Effects of the Utilization of Graduate Education on Promotion and Executive Officer/Command Screening in the Surface Community," Master's Thesis, Naval Postgraduate School, March 1996.

## PROJECT SUMMARIES

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Kovach, John P., "An Analysis of Naval Officer's Serving on Joint Duty: The Impact of the 1986 Goldwater-Nichols Act," Master's Thesis, Naval Postgraduate School, March 1996.

Riebel, David, "An Analysis of the Effects of Increase in Aviation Bonuses on the Retention of Naval Aviators Using an Annualized Cost of Leaving (ACOL) Approach," Master's Thesis, Naval Postgraduate School, March 1996.

Rogge, Frank, "An Analysis of the Voluntary Separation Bonus (VSI/SSB) Program Using the Annualized Cost of Leaving Model," Master's Thesis, Naval Postgraduate School, March 1996.

### **DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Officer retentionpromotion, annualized cost of leaving model, separation bonus, retention bonus, graduate education

### **INFORMATION TECHNOLOGY ACQUISITION**

**Janice M. Menker, Lecturer**

**Department of Systems Management**

**Sponsr: Naval Postgraduate School**

**OBJECTIVE:** The main goal of this project was preparation of a conference paper and presentation on the changes to information technology acquisition resulting from the Information Technology Management Reform Act passed by the 104th Congress.

**SUMMARY:** The Information Technology Management Reform Act reversed 30 years of legislation intended to control how the government acquired information resources. The Act transferred responsibility for oversight from the General Services Administration to the Office of Management and Budget; required all agencies and departments to appoint Chief Information Officers; and specified that information resources be an integral part of the planning and budgeting process to include strategic planning.

### **PUBLICATION:**

Menker, Janice M., "Using Information Technology to Improve Acquisition Practices," Proceedings of the Defense Systems Management College Alumni Association Symposium, Ft. Belvoir, VA, Department of Defense, , July 1996.

### **CONFERENCE PRESENTATION:**

Menker, Janice M., "Using Information Technology to Improve Acquisition Practices," Defense Systems Management College Alumni Association Symposium, Ft. Belvoir, VA, July 1996.

### **THESES DIRECTED:**

Polowczyk, John Phillip, "Market Research in the United States Navy: A Study of the Skills and Tools Required to Conduct Market Research, The Application of Information Technology," Master's Thesis, Naval Postgraduate School, December 1996.

Davis, Albert L., "Implementation of Electronic Funds Transfer (EFT)/Financial Electronic Data Interchange (FEDI) in the Department of Defense: Lessons Learned from Private Industry," Master's Thesis, Naval Postgraduate School, June 1996.

Gray, Robert., "Implementation of Electronic Commerce/Electronic Data Interchange in the Navy: A Case Study using Organization Theory," Master's Thesis, Naval Postgraduate School, December 1996.

## PROJECT SUMMARIES

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**DoD KEY TECHNOLOGY AREAS:** Other (Information Technology Acquisition)

**KEYWORDS:** Information Technology Management Reform Act

### AN ANALYSIS OF FINANCIAL CONDITION SCORING MODELS FOR DEFENSE INDUSTRY FIRMS

O.D. Moses, Associate Professor

Department of Systems Management

Sponsor: Naval Postgraduate School

**OBJECTIVE:** The goal of this project was to document and evaluate the use of financial scoring models and their role in financial analysis within DoD. This year's work continued research on financial analysis of defense industry firms initiated in 1995.

**SUMMARY:** In support of their missions, various military organizations, including the Naval Center for Cost Analysis (NCCA), conduct financial analyses of defense industry firms. This project was designed to assist in laying a foundation for reconstructing /recalibrating the Navy-Z financial scoring model used by NCCA. One part of this year's effort involved documenting the practice of financial analysis of defense industry firms as currently conducted by organizations within DoD. Five organizations actively involved in financial analysis were identified, and findings indicated wide differences in analytical approaches and the use of financial scoring models across the various organizations. The second part involved a review and critique of the validity and applicability of existing financial condition scoring models, as well as approaches to constructing such models. A six-dimension framework was developed for conducting the review and existing literature and models were evaluated using the framework. Conclusions and implications concerning the construction and use of financial scoring models within the defense setting resulted.

#### PUBLICATION:

Moses, O.D., "Basic Dimensions of Financial Condition Within the Defense Industry," Journal of Cost Analysis, submitted.

#### CONFERENCE PRESENTATIONS:

Moses, O.D., "Forecasting Financial Ratios in the Defense Industry," 29th Annual DoD Cost Analysis Symposium, Washington, DC, February 1996.

Moses, O.D., "Basic Dimensions of Financial Condition Within the Defense Industry," Society of Cost Estimating and Analysis National Conference, Orlando, FL, June 1996.

#### THESIS DIRECTED:

Candreva, Philip J., "The Use of Financial Scoring Models for Prediction of Business Failure: Implications for Department of Defense Financial Analysis," Master's Thesis, Naval Postgraduate School, June 1996.

**DoD KEY TECHNOLOGY AREAS:** Other (Financial Analysis)

**KEYWORDS:** Financial analysis, financial ratios, financial condition, defense industry

## PROJECT SUMMARIES

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### **FINANCIAL ACCOUNTING AND REPORTING IN THE DOD: THE STATE OF THE ART**

**O.D. Moses, Associate Professor**  
**Department of Systems Management**  
**Sponsor: Unfunded**

**OBJECTIVE:** The objective of this line of research is to describe and critique the current state of financial accounting and reporting as practiced within the DoD.

**SUMMARY:** Recent years have seen significant changes within the DoD which impact financial reporting. There has been a general shift toward more "business-like" management practices. There have been initiatives, such as the CFO Act and the Federal Accounting Standards Advisory Board, which have resulted in changes in both the requirement for, and the content of, the financial reporting of DoD activities. This research project has documented the existing state of financial reporting within DoD. Financial reporting was split into two broad types: budgetary reporting and proprietary reporting. Current practice was described in terms of the objectives of financial reporting, the basic conceptual reporting models, the kinds and content of financial reports produced, the information systems use to support financial reporting, and the use and users of financial report information.

**THESES DIRECTED:**

Stephens, P.C., "The State of the Art of Budgetary Financial Reporting," Master's Thesis, Naval Postgraduate School, December 1996.

Manning, J.L., "The State of the Art of Proprietary Financial Reporting in the Department of the Navy," Master's Thesis, Naval Postgraduate School, December 1996.

**DoD KEY TECHNOLOGY AREAS:** Other (Financial Accounting/Reporting)

**KEYWORDS:** Financial accounting, financial reporting

### **JOINT RAPID PROTOTYPE AND INTEGRATED PRODUCT TEAM DEVELOPMENT STRUCTURE (JRAPIDS)**

**Walter E. Owen, Leturer**  
**Department of Systems Management**

**Sponsors: Defense Acquisition University (DAU) and Naval Postgraduate School Center for Acquisition  
Education, Training and Research (CAETR)**

**OBJECTIVE:** The main goal of this project is to develop a concept referred to as JRAPIDS which outlines a strategy for implementing an expeditious and affordable high quality process to meet Defense Acquisition University Intermediate Systems Acquisition Course (ACQ-201) requirements for FY96 and beyond.

The Naval Postgraduate School (NPS) and the Naval Center for Acquisition Training (NCAT) as a part of the NPS Center for Acquisition Education, Training and Research developed the concept in coordination with the Defense Acquisition University (DAU) and the course sponsor, the Defense Systems Management College (DSMC).

The JRAPIDS concept is a full and open cooperative team approach designed to provide an organized structure to foster innovation and creativity to the implementation of ACQ-201 course requirements and resource scheduling. The concept utilizes an empowered Integrated Product Team (IPT) organizational structure which is used to formulate and employ a rapid prototype strategy and faculty certification process for conducting the course.

The initial offering of this four week course began 3 June 1996 at NCAT Midwest, Rock Island, Illinois. There were three more JRAPIDS ACQ-201 offerings the summer of FY- 96 and twenty-eight offerings scheduled across the nation in FY-97. This is an on-going project that is currently managed by DAU and CAETR.

## PROJECT SUMMARIES

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### PUBLICATION:

Owen, Walter E., "Joint Rapid Prototype and Integrated Product Team Development Structure (JRAPIDS); A 'Walk the Talk' Success Story for DAU implementing IPTs within Acquisition Education and Training," Acquisition Review Quarterly, submitted.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Integrated product teams, rapid prototype strategy

### COMPLEX TRACEABILITY TECHNIQUES

B. Ramesh, Associate Professor

Department of Systems Management

Sponsor: Naval Surface Warfare Center-Dahlgren Division

**OBJECTIVE:** The objective of this research is to develop a model of requirements traceability to support various stakeholders in large scale systems development.

**SUMMARY:** Development of complex, mission critical systems involves modification, refinement and evolution of initial requirements that lead to design solutions. In order to provide intelligent and useful support to the process of design and maintenance, a formal representation of the linkages between the design solutions and the requirements is essential. Based on an extensive empirical study of systems development personnel, this project has developed several models for requirements traceability. The semantics of various kinds of traceability information that can be captured and used in large scale systems development activities has been clearly defined. These models are being incorporated in several system engineering tools.

### PUBLICATIONS:

Ramesh, B., "Managing Organizational Memory," Proceedings of the Hawaii International Conference on System Sciences, accepted.

Ramesh, B., and Bui, T., "Decision Support: Recent Applications and Lessons Learned," Editorial to Special Issue, Journal of Decision Systems, Vol. 5, No. 3-4, 1996.

Ramesh, B., Stubbs, C., Powers, T., and Edwards, M., "Requirements Traceability: Theory and Practice," Annals of Software Engineering, accepted.

### CONFERENCE PRESENTATIONS:

Ramesh, B., "Organizational Memory," Knowledge Based Software Engineering Conference, Syracuse, NY, September 1996.

### THESES DIRECTED:

Ring, K., and Sadoski, D., "An Implementation of Traceability Models," Master's Thesis, Naval Postgraduate School, September 1996.

Stueve, R., "The Development of a Graphical User Interface for REMAP," Master's Thesis, Naval Postgraduate School, September 1996.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software, Other (Design Automation)

## PROJECT SUMMARIES

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**KEYWORDS:** Requirements traceability, systems development

### **EVALUATION OF KNOWLEDGE-BASED SOFTWARE TOOLS AND REQUIREMENTS ENGINEERING IN KNOWLEDGE-BASED SOFTWARE**

**B. Ramesh, Associate Professor**  
**Department of Systems Management**  
**Sponsor: U.S. Air Force, Rome Laboratory**

**OBJECTIVE:** The objective of this research is to develop an environment to support the capture of design rationale in knowledge based software engineering environment.

**SUMMARY:** This research has resulted in the development of a system to retain design rationale knowledge during the development of software systems. We have developed a prototype collaborative system that will permit the adaptive retention and reuse of such knowledge. This research has applicability in areas such as software engineering, concurrent engineering, and joint task force planning processes. This approach has been validated in the context of large scale systems development to elevate the process of systems maintenance to the level of specifications and the rationale behind their creation. The result of the study have implications for organizational learning as well as the capture and reuse of design rationale.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software, Other (Design Automation)

**KEYWORDS:** Design rationale, process knowledge, systems development

### **DYNAMICS OF CHANGE**

**Nancy Roberts, Professor**  
**Department of Systems Management**  
**Sponsor: Unfunded**

**OBJECTIVE:** This research represents an ongoing effort to empirically examine the dynamics of change. Its objective is to investigate, in real time, how change agents (public entrepreneurs and transformational leaders) diagnose problems in a system, conceptualize what changes are needed, and then design interventions to lead the change process.

**SUMMARY:** Public organizations are challenged to adapt to an increasingly competitive economic, political, technological, and social environment. Government policies established under the Post World War II era are being reexamined, and many cases, rejected. A massive world-wide transformation is underway, forcing policy makers to rethink their fundamental assumptions in all domains of public life, from education to war fighting.

Often reliant on incremental thinking and reactive problem solving, policy makers and public managers now are encouraged to be change agents, public entrepreneurs, and transformational leaders who will move us beyond the "givens" of public policy and management. How does one transform public policy? How does one reconfigure public bureaus to direct and implement those policies? These are the basic questions of this research.

The research has two aspects—the domain of public policy and the domain of public management. Radical, transformative changes in public policy have been the primary research focus over the past twelve years. Having completed a longitudinal study of radical policy change in 1995, the next phase of the project tackles the implications of radical policy change for public bureaus. It is expected that as radical shifts in public policy occur, public bureaus will need to be reconfigured and redesigned to match the new realities. This next phase of the project examines how the redesign efforts are faring and what lessons we can draw from them to aid military organizations.

## PROJECT SUMMARIES

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### PUBLICATIONS:

Roberts, N.C., "Innovation by Legislative, Judicial, and Management Design: Three Arenas of Public Entrepreneurship," Reinventing Public Administration: The Management of Reform and Innovation, H. George Frederickson and Jocelyn M. Johnston, (eds.), University of Alabama Press, accepted.

Roberts, N.C., "Public Deliberation: An Alternative Approach to Crafting Policy and Setting Direction," Public Administration Review, accepted.

Roberts, N.C. "Public Entrepreneurship as Social Creativity," The Social Dimensions of Creativity, Vol. 3, Alfonso A. Montuori and Ronald E. Purser (eds.), Hampton Press, accepted.

Roberts, N.C. and King, P.J., Transforming Public Policy: Dynamics of Entrepreneurship and Innovation, San Francisco, Jossey-Bass, 1996.

### THESES DIRECTED:

Simon, C., "Strategic Planning in Military Organizations," Master's Thesis, Naval Postgraduate School, March 1996.

Dugan, L., "The Impact of Case Tools, ADA, and Software Reuse on a DoD Software Development Project," Master's Thesis, Naval Postgraduate School, March 1996.

**DoD KEY TECHNOLOGY AREAS:** Other

**KEYWORDS:** Change, strategy, planning

### TRICARE FINANCIAL MANAGEMENT EXECUTIVE EDUCATION PROGRAM

Joseph G. San Miguel, Professor

Department of Systems Management

**Sponsor:** Office of the Secretary of Defense (Health Affairs)

**OBJECTIVE:** This research program was undertaken to design, develop, and test an executive education program on financial management for senior health care officers in the Army, Air Force, and Navy. The program was necessitated by the recent TRICARE managed care support contracts between DoD and private sector health care providers.

**SUMMARY:** Starting in 1995, the Military Health Services System (MHSS) of the Department of Defense awarded multi-million dollar contracts to private sector health care organizations that will provide services to non-active duty military beneficiaries. These are formal, strategic partnerships covering five years and include complex bid price, bid price adjustment, resource sharing, and utilization management provisions. The risk sharing between the government and contractors for losses and/or gains is a significant feature of the long-term contractual arrangement. The contracts are managed by newly created tri-service, regional offices of the MHSS. The resulting dramatic changes in the military health care delivery system and the new financing arrangements resulted in the need for new management education courses covering wide ranging areas of top management responsibilities. Topics include strategic planning, budgeting, contracting, bid price adjustments, resource sharing agreements, information systems, and utilization management. Information was gathered through field research involving cognizant managers at all levels of the medical service organizations of the Army, Air Force, and Navy, the newly created Regional Offices of the MHSS, and at OASD Health Affairs. Course materials consisting of visual presentations, computer based applications, case studies, technical notes, and reading materials were prepared and delivered to the sponsor and the program was successfully tested. In addition, military instructors were identified to participate in the future delivery of the program.

## PROJECT SUMMARIES

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### THESES DIRECTED:

McCue, M.D., "An Evaluation of Resource Sharing Within TRICARE's Managed Care Support Contracts," Master's Thesis, Naval Postgraduate School, September 1996.

Portis, A.L., "An Evaluation of Transfer Payments Within the Military Health Services System," Master's Thesis, Naval Postgraduate School, June 1996.

### OTHER:

San Miguel, J.G., "MHSS Transfer Payments: A Case Study."

San Miguel, J.G., "Central Medical Treatment Facility: A Case Study in Resource Sharing."

San Miguel, J.G., "Seaside Lead Agent: A Case Study in Resource Sharing."

San Miguel, J.G., "Trans America Health Care, Inc.: A Case Study in Resource Sharing."

### DoD KEY TECHNOLOGY AREAS: Other

**KEYWORDS:** Financial management, health care, managed care

### COMPUTER NETWORK PERFORMANCE MODELS

Norman E. Schneidewind, Professor

Department of Systems Management

Sponsor: Unfunded

**OBJECTIVE:** Develop an Ethernet performance model that would provide a greater detail of analysis than that available in other models and include all components of a LAN (e.g., hard disk) in the analysis.

**SUMMARY:** There is a plethora of models that deal with just the Ethernet component of LAN performance. These models typically evaluate performance in terms of engineering performance measures like utilization, throughput, offered load, and transmission delay, as opposed to *user* oriented measures. A complete model of user request response time—the performance measure that is meaningful to the user—that would also include other components such as disk queue and access times was wanted; these actually account for more of the total response time than the Ethernet bus delay components. The model would be used as a decision making tool for estimating response times, under given loads and server configurations, and for choosing the best number of servers, based on a comparison of marginal improvement in response time with marginal cost. Motivation was the challenge of designing the Ethernet components of the model for simultaneous rather than random user inputs and server outputs. In the first implementation of the model, the Ethernet bus delay response time components were modeled by classical formulas involving expected delay as a function of probability of obtaining access to the Ethernet, average bus utilization, and packet size. Building upon this work to generalize the Ethernet model components for simultaneous user input and simultaneous server response. It was shown that the model could be used to make important decisions concerning the optimal number of servers to use in the network and as a means of identifying the important contributors to response time.

### PUBLICATION:

Schneidewind, N.F., "A Fine-Grained Ethernet Performance Model" Telecommunications Systems, Baltzer Science Publishers, Vol. 6, No. 1, August 1996, pp. 77-90.

## PROJECT SUMMARIES

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### THESES DIRECTED:

Arum, Mochamad, "The Integration of Local Area Networks in Labs I-224 and I-250 in the Systems Management Department," Master's Thesis, Naval Postgraduate School, March 1996.

Chavez, Carlos M., "Fiber Distributed Data Interface (FDDI) Applications in DoD: Cost and Benefit Analysis of Implementing an FDDI LAN at the Naval Postgraduate School, Monterey, CA," Master's Thesis, Naval Postgraduate School, March 1996.

Herl, Matt and Rehard, Greg, "Baseline Model for a Local Area Network in the Former Soviet Union," Master's Thesis, Naval Postgraduate School, March 1996.

Li, H., "Local Area Network Design for the Taiwan Naval Academy," Master's Thesis, Naval Postgraduate School, March 1996.

Sauer, Mark F., Smith, Tim, Sprague, John W., and Staier, Joseph, "A Feasibility Comparison and Analysis between the UNIX Environment and the Windows NT Environment for Integration with the Joint Maritime Command Information System (JMCIS) Architecture," Master's Thesis, Naval Postgraduate School, September 1996.

Williams, Robert, "Asynchronous Transfer Mode (ATM) Applications in DoD: Feasibility of Implementing a Local ATM Network at the Naval Postgraduate School, Monterey, CA," Master's Thesis, Naval Postgraduate School, March 1996.

### DoD KEY TECHNOLOGY AREAS: Modeling and Simulation

**Keywords:** Ethernet, performance analysis, modeling

### DEVELOPMENT OF A CLIENT-SERVER SOFTWARE RELIABILITY MODEL

Norman F. Schneidewind, Professor

Department of Systems Management

Sponsor: Naval Surface Warfare Center-Port Hueneme Division

### OBJECTIVE: Develop a client-server software reliability model.

**SUMMARY:** Too often the assumption is made, when doing software reliability modeling and prediction, that the software involves either a single module or node. The reality in today's increasing use of multi node client-server systems is that there are multiple entities of software that execute on multiple nodes that must be modeled in a system context, if realistic reliability predictions and assessments are to be made. For example if there are  $N_C$  clients and  $N_S$  servers in a client-server system, it is not necessarily the case that a software failure in any of the  $N_C$  clients or  $N_S$  servers will cause the system to fail. Thus, if such a system were to be modeled as a single entity, the predicted reliability would be much lower than the true reliability because the prediction would not account for criticality and redundancy. The first factor accounts for the possibility that the survivability of some clients and servers will be more critical to continued system operation than others, while the second factor accounts for the possibility of using redundant nodes to allow for system recovery should a critical node fail. To address this problem, the identity of which nodes — clients and servers — are critical and which are not critical, as defined by whether these nodes are used for critical or non-critical functions, respectively.

### PUBLICATIONS:

Schneidewind, N.F., "Reliability and Risk Analysis for Software That Must be Safe," Proceedings of the International Symposium on Software Metrics, Berlin, Germany, 25-26 March 1996, pp. 142-153.

## PROJECT SUMMARIES

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Schneidewind, N.F., Tutorial Notes: "Software Reliability Engineering for Client-Server Systems," Quality Week, Software Research, Inc., San Francisco, CA, 21 May 1996.

Schneidewind, N.F., "Reliability Modeling for Safety Critical Software," Lecture Notes in Computer Science, 1088, Alfred Strohmeier (ed.), Reliable Software Technologies - Ada-Europe '96, 1996 Ada-Europe International Conference on Reliable Software Technologies, Montreux, Switzerland, June 1996, Proceedings, Springer-Verlag, Berlin, Germany, pp. 17-37.

Schneidewind, N.F., "Software Reliability Engineering for Client-Server Systems," Proceedings of the Seventh International Symposium on Software Reliability Engineering, White Plains, NY 30 October-2 November 1996, pp. 226-235.

Schneidewind, N.F., Tutorial Notes: "Software Reliability Engineering for Client-Server Systems," The Seventh International Symposium on Software Reliability Engineering, White Plains, NY, 30 October-2 November 1996.

Schneidewind, N.F., "NASA Shuttle Software Maintenance Evolution," Proceedings of the International Conference on Software Maintenance, Monterey, CA, 4-8 November 1996, pp. 38-40.

Schneidewind, N.F., Tutorial Notes: "Tutorial on a Methodology for Software Quality Metrics For Maintenance," International Conference on Software Maintenance, Monterey, CA, 4 November 1996.

Schneidewind, Norman F., "Reliability Modeling for Safety Critical Software," IEEE Transactions on Reliability, accepted.

Schneidewind, Norman F., "Data Collection Demonstration and Software Reliability Modeling for a Multi-Function Distributed System," Proceedings of the Twentieth Annual Software Engineering Workshop, NASA Goddard, Greenbelt, Maryland, March 1997.

### CONFERENCE PRESENTATIONS:

Schneidewind, N.F., "Reliability and Risk Analysis for Software That Must be Safe," International Symposium on Software Metrics, Berlin, Germany, 25-26 March 1996.

Schneidewind, N.F., "Reliability and Risk Analysis for Software That Must be Safe," Technical University of Dresden, Computer Science Department, Dresden, Germany, 27 March 1996.

Schneidewind, N.F., Tutorial: "Software Reliability Engineering for Client-Server Systems," Quality Week, Software Research, Inc., San Francisco, CA, 21 May 1996.

Schneidewind, N.F., "Lessons Learned in Developing and Applying Software Reliability and Metrics Models: NASA Space Shuttle Example," Joint Research Conference on Statistics in Quality, Industry and Technology, National Institute of Standards and Technology, Gaithersburg, MD, 29-31 May 1996.

Schneidewind, N.F., "Reliability Modeling for Safety Critical Software," 1996 Ada-Europe International Conference on Reliable Software Technologies, Montreux, Switzerland, June 1996, Proceedings, Springer-Verlag, Berlin, Germany.

Schneidewind, N.F., "Software Reliability Engineering for Client-Server Systems," The Seventh International Symposium on Software Reliability Engineering, White Plains, NY, 30 October-2 November 1996.

Schneidewind, N.F., Tutorial: "Software Reliability Engineering for Client-Server Systems," The Seventh International Symposium on Software Reliability Engineering, White Plains, NY, 30 October-2 November 1996.

## PROJECT SUMMARIES

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Schneidewind, N.F., "Tutorial on a Methodology for Software Quality Metrics For Maintenance," International Conference on Software Maintenance, Monterey, CA, 4 November 1996.

Schneidewind, N.F., "NASA Shuttle Software Maintenance Evolution," International Conference on Software Maintenance, Monterey, CA, 4-8 November 1996.

Schneidewind, N.F., "NASA Space Shuttle Software Risk Analysis," Workshop on Empirical Studies in Software Maintenance, Monterey, CA, 8 November 1996.

Schneidewind, N.F., "Data Collection Demonstration and Software Reliability Modeling for a Multi-Function Distributed System," Twentieth Annual Software Engineering Workshop, NASA Goddard, Greenbelt, MD, 4 December 1996.

### OTHER:

Schneidewind, Norman F., "Software Reliability Prediction Equations for a Client-Server Software Reliability Model," implemented in the *Statgraphics Plus* statistical package (model and software).

### THESIS DIRECTED:

Lasure, Jean D. and Christopher J. Page, "Network Design for the Naval Warfare Center at Port Hueneme, CA," Master's Thesis, Naval Postgraduate School, March 1996.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software

**KEYWORDS:** Software reliability, software quality metrics, modeling

### SOFTWARE RELIABILITY ENGINEERING PROGRAM: IMPLEMENTATION SUPPORT

Norman F. Schneidewind, Professor

Department of Systems Management

Sponsor: Marine Corps Tactical System Support Activity

**OBJECTIVE:** Implement a software reliability program for MCTSSA.

**SUMMARY:** The objective of this project was to improve the software reliability of Marine Corps AISs. In order to achieve this goal, a Software Reliability Engineering (SRE) process was designed for the implementation of reliability improvements in distributed systems. The reliability model and associated process, and the criteria for judging whether reliability goals have been met, encompassed multi-node systems. The reliability plan "in the small" before committing to it "in the large," was prototyped. This meant trying out the model and the process on a relatively simple system with a minimum number of personnel involved. Based on this approach, it was feasible to develop a system software reliability model for distributed systems. In order to implement the approach, it was necessary to partition the defects and failures into critical and non-critical classes and to further classify them as being associated with critical and non-critical servers and clients. Once this was done, predictions were made of *time to next failure* for each class; the predictions were classified according to those that would result in a software failure and those that would result in a system failure; and the probability of system failure was computed.

### PUBLICATIONS:

Schneidewind, N.F., and Norman Fenton, "Point-Counterpoint: Do Standards Improve Quality?" *IEEE Software*, Vol. 13, No.1, January 1996, pp. 22-24.

Schneidewind, N.F., and Judie A. Heineman, "MCTSSA Software Reliability Handbook, Final Version," 10 January 1996, Naval Postgraduate School, Monterey, CA.

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Schneidewind, N.F., and Judie A. Heineman, "MCTSSA Software Reliability Engineering Training Plan, Final Version," 10 January 1996, Naval Postgraduate School, Monterey, CA.

Schneidewind, N.F., Software Metrics Model for MCTSSA Quality Control and Prediction Marine Corps Tactical Support Activity, 25 October 1996.

Schneidewind, N.F., "Integration of Software Process and Product Quality," Proceedings of the Second World Conference on Integrated Design and Process Technology, Austin, TX, 2-6 December 1996.

Schneidewind, N.F., Heineman, J., and Warburton, K., "Software Reliability Engineering Process Experience Report," Proceedings of the Eighth Annual Software Technology Conference, (CD/ROM), Salt Lake City, UT, 21-26 April 1996.

### CONFERENCE PRESENTATIONS:

Schneidewind, N.F., "Integration of Software Process and Product Quality," Second World Conference on Integrated Design and Process Technology, Austin, TX, 2-6 December 1996.

Schneidewind, N.F., Heineman, J., and Warburton, K., "Software Reliability Engineering Process Experience Report," Eighth Annual Software Technology Conference, (CD/ROM), Salt Lake City, UT, 21-26 April, 1996.

### THESIS DIRECTED:

Heineman, Judie A., "Software Reliability Engineering Process for MCTSSA, Camp Pendleton, CA," Master's Thesis, Naval Postgraduate School, March 1996.

**DoD KEY TECHNOLOGY AREAS:** Computing and Software

**KEYWORDS:** Software reliability prediction, software reliability program

### A BLUEPRINT FOR RESEARCH IN DEFENSE ACQUISITION

Keith F. Snider, Assistant Professor  
Department of Systems Management  
Sponsor: Naval Postgraduate School

**OBJECTIVES:** To accomplish foundational work to make possible the development of a sensible and coherent body of research in the emerging field of defense acquisition; to propose a strategy and framework for Department of Defense investments in the conduct of acquisition research.

**SUMMARY:** The Principal Investigator began work on this project in October 1996, and the work will continue through 1997 and most of 1998. The work accomplished during 1996 was preliminary and largely exploratory in nature, consisting primarily of identifying the appropriate source literature. The PI was concerned in this effort to reach beyond the traditional boundaries of acquisition to related fields (e.g., management, political science) that may contribute to the theory of acquisition, but which as of yet has not been drawn upon in any organized way.

### THESES DIRECTED:

Atkinson, J.W., "The Theater High Altitude Area Defense Program: An Interim Examination of its Acquisition Strategy," Master's Thesis, Naval Postgraduate School, June 1996.

Housewright, R.W., "The Tri-band Satellite Terminal: A Case Study in Accelerated Acquisition and Program Management of Army Communications Systems," Master's Thesis, Naval Postgraduate School, December 1996.

## PROJECT SUMMARIES

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Openshaw, S.T., "Military Products from Commercial Production Lines—A Feasibility Study," Master's Thesis, Naval Postgraduate School, December 1996.

### **PUBLICATION:**

Snider, K.F., "DAWIA and the Price of Professionalism," Acquisition Review Quarterly, Vol. 3, No. 2, Fall 1996.

**DoD KEY TECHNOLOGY AREAS:** Other (Systems Acquisition Management)

**KEYWORDS:** Acquisition, program management, contracting, systems engineering

### **EXPERIMENTATION OF BONUS INCENTIVE RECRUITING MODEL (BIRM)**

**K.L. Terasawa, Associate Professor**

**K. Kang, Associate Professor**

**Department of Systems Management**

**Sponsor: U.S. Army Recruiting Command**

**OBJECTIVE:** The goal of this project is to develop and implement the bonus incentive recruiting model (BIRM) for Army recruiting. This would help maximize market potential, and increase cost-effectiveness of USAREC operation.

**SUMMARY:** Under the current quota-based Army recruiting system, the local stations are required to meet a quota established by headquarters. If a station fails to fulfill its quota, the station commander may face significant penalty including a risk of being relieved of his duty. On the other hand, the reward for exceeding the quota seems relatively minor. The quota system with an asymmetric reward structure has created an overly risk-averse working environment for recruiters. In this risk-averse environment, there is little incentive to surpass quotas. Since the penalty for missing their quota is so great, the system has a built-in tendency to set a lower quota at the face of any uncertainty. In order to counter this potential inefficiency, the USAREC headquarters has set station quota targets much higher than the comparable national level. The consequence of this high quota setting for stations is evidenced by the large number of unsuccessful stations (stations that did not fill their mission box) even when the national accession goal for the USAREC is met at a comfortable margin. The success of headquarters at the expense of foxhole recruiters and the recruiting stations, however, is an inevitable consequence of USAREC's effort to achieve its national mission under the current quota-based recruiting system. The sacrifice of the foxhole recruiters in terms of "high failure rates" and their high turnover and low morale may become more prevalent with an expected increase in mission level in the coming years without a commensurate increase in USAREC resources.

The Bonus Incentive Recruiting Model (BIRM) was developed and implemented. Ways to improve the overall efficiency of USAREC recruiting practices were explored. The model was renamed PRIME (Production Recruiting Incentive Model). Under the PRIME, the production goal is forecasted by recruiters based on their market analysis. They are awarded by the accuracy of their forecast as well as the production. The experiment was conducted at the Albany (NY) Recruiting Battalion in the third quarter of 1996. With little time for training, the recruiters were forced to participate in the experiment without clear understanding of the concepts. The implementation has not been successful. Currently a proposal is pending to implement the model to a larger control groups of battalions.

### **PUBLICATION:**

Terasawa, K.L., "Quota-Based Recruiting System and Bonus Incentive Recruiting Model (BIRM)," Proceedings of the 64th Military Operations Research (MORS).

### **CONFERENCE PRESENTATIONS:**

Terasawa, K.L., and Kang, K., "Implementation of the Production Recruiting Incentive Model (PRIME)," INFORMS National Meeting, Atlanta, GA, November 1996.

## PROJECT SUMMARIES

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Kang, K., and Terasawa, K.L., "Experimentation of Bonus Incentive Recruiting Model (BIRM)," 64th Military Operations Research Conference (MORS), Ft. Leavenworth, KS, June 1996.

### THESIS DIRECTED:

Wilson, G.K., "The Analysis of Production Recruiting Incentive Model (PRIME) within the U.S. Army Recruiting Command," Master's Thesis, Naval Postgraduate School, December 96.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Army, recruiting, incentive system

### APPLICATION OF INTRINSIC MOTIVATION TO THE MILITARY

Kenneth W. Thomas, Professor

Erik Jansen, Visiting Associate Professor

Department of Systems Management

**Sponsor:** Eighth Quadrennial Review of Military Compensation

**OBJECTIVE:** To support the Presidentially-mandated Eighth Quadrennial Review of Military Compensation (8th QRMC) in developing recommendations for a DoD human resource system for the 21st century. This project focuses on the role of intrinsic motivation (IM) in motivating performance. The goal is to apply IM theory to develop a conceptual foundation for an integrated military compensation/human resource system linking both intrinsic and extrinsic rewards to organizational strategies.

**SUMMARY:** During the current year, theory was developed on the nature and content of IM, its relationship to individual self-management, and the strategic importance of IM and self-management to the military in the 21st century. Intrinsic motivation (rewards received directly from work tasks) was distinguished from extrinsic motivation and normative forces. In addition, considerable attention was given to the determinants of IM and self-management in the military, with a special emphasis on the forms of leadership required for self-management.

The 8th QRMC found this work extremely helpful in providing a basis for predicting effects of changes in the DoD human resource system upon military behavior and organizational outcomes. Intrinsic motivation and self-management play a central theoretical role in their draft report.

### PUBLICATION:

Thomas, K.W., and Jansen, E., "Intrinsic Motivation in the Military: Models and Strategic Importance," Technical Report NPS-SM-96-001, Naval Postgraduate School, September 1996.

### CONFERENCE PRESENTATION:

Thomas, K.W., and Jansen, E., "Empowerment in the Military: Strategic Importance and Implications for Reward Systems," Academy of Management 1996 Annual Meeting, Cincinnati, OH, 9-14 August 1996.

Thomas, K.W., and Jansen, E., "Intrinsic Motivation and the Military: Second Briefing," Eighth Quadrennial Review of Military Compensation, Arlington, VA, 23 January 1996.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Intrinsic motivation, self-management, human resources, leadership, Eighth Quadrennial Review of Military Compensation

## PROJECT SUMMARIES

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### DEVELOPMENT OF TROOP PROGRAM UNIT LEADERSHIP TRAINING

**Kenneth W. Thomas, Professor**

**Department of Systems Management**

**Sponsor: Office of the Chief of Army Reserves**

**OBJECTIVE:** To increase readiness and retention in company-level units (Troop Program Units, or TPUs) in the U.S. Army Reserve through improved leadership training. This project will develop a program of instruction (POI) for a leadership course for prospective TPU commanders, together with a pamphlet on TPU leadership to support that course.

**SUMMARY:** This 1996-1997 project follows a 1995-96 study, "TPU Leadership Analysis, Phase II: Studies of High and Low Retention Units." Based upon a literature review and elaborate interviews, that previous study developed a conceptual model of the unit conditions which produce readiness and retention in TPUs, as well as identifying specific leadership behaviors by the TPU commander that help to build those conditions. Findings of that study were well received by the U.S. Army Reserve Command and the Chief, U.S. Army Reserve. The current project represents an implementation of one of the prior study's recommendations, namely the development of a course for prospective TPU commanders based upon that study's findings.

The course will present the general model of leadership goals and behaviors emerging from the earlier study, as well as providing in-depth practice in handling key behavioral areas. Likely areas include the management of unit training, turning around units with low standards, and leadership styles that build confidence and respect in the commander. The technical report of the earlier study will also be re-written as a U.S. Army Reserve Command pamphlet to support the course.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Leadership training, retention, readiness, Troop Program Unit, Army Reserve

### LEADERSHIP AND RETENTION IN TROOP PROGRAM UNITS (TPU), PHASE III: DEVELOPING LEADERSHIP METRICS

**Kenneth W. Thomas, Professor**

**Erik Jansen, Visiting Associate Professor**

**Department of Systems Management**

**Sponsor: Office of the Chief of Army Reserves**

**OBJECTIVE:** The objective is to increase readiness and retention in company-level units in the U.S. Army Reserve (Troop Program Units, or TPUs) by providing a reliable means of measuring strong and weak leadership areas of TPU commanders. These metrics will be designed to provide diagnostic data for mentoring of TPU commanders by their battalion commanders and/or Regional Support Commands.

**SUMMARY:** This 1996-97 project follows a 1995-96 study, "TPU Leadership Analysis, Phase II: Studies of High and Low Retention Units." Based upon a literature review and elaborate, qualitative interviews, that earlier study developed a conceptual model of the unit conditions which produce readiness and retention in TPUs, as well as identifying specific leadership behaviors by TPU commanders that help build those conditions. Findings of that study were well received by the U.S. Army Reserve Command and the Chief, U.S. Army Reserve. This current project represents an implementation of one of the prior study's recommendations, namely the development of measures of the leadership behaviors and goals identified in that study. The primary use of these measures will be for the mentoring of current TPU commanders by their superiors. However, the measures will also provide a means for future quantitative studies of effective leadership in TPUs. The measures developed will include ratings of key conditions in the TPU by unit soldiers, as well as ratings of the leader's behaviors by those members of the TPUs' management that have most direct contact with the commander.

## PROJECT SUMMARIES

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**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Leadership measurement, retention, readiness, Troop Program Unit, Army Reserve

### **TROOP PROGRAM UNIT LEADERSHIP ANALYSIS, PHASE II: STUDIES OF HIGH AND LOW RETENTION UNITS**

**Kenneth W. Thomas, Professor**

**Robert Barrios-Choplin, Visiting Assistant Professor**

**Department of Systems Management**

**Sponsor: Office of the Chief of Army Reserves**

**OBJECTIVE:** To identify leadership behaviors by commanders of company-level units in the U.S. Army Reserve (Troop Program Units, or TPUs) that increase unit-level retention and readiness. In addition, to identify policy recommendations that are implied by the findings—especially regarding the training and mentoring of TPU commanders.

**SUMMARY:** Extensive interviews were conducted at sixteen high-priority (Force Support Package) TPU's, focusing on effective/ineffective leadership behavior by company commanders. Results underscore the fundamental importance of leadership to unit readiness and retention.

The study identified leader behaviors that influence readiness and retention by building five key conditions in the unit: training quality, standards, cohesiveness, confidence/respect in the leader, and support from spouses and employers. One finding involves the importance of the leader's time commitment. Another involves behaviors essential to managing unit training, including availability, planning and delegation, and protecting the plan. Another includes a strategy for raising low standards. Another identifies three leadership values that tend to produce trust and confidence: mission, standards, and soldier care. Best practices were identified, along with two "leadership traps" that some leaders fell into, involving micromanagement and punishment. Results of the study were briefed to a meeting of all general officers in the U.S. Army Reserve, and were also published in a technical report. Key recommendations of the study have been adopted involving: (1) the development of a mandatory course on leadership for prospective commanders based on the findings, and (2) design of a measure of the leadership behaviors of present commanders, for use in mentoring.

#### **PUBLICATION:**

Thomas, K.W., and Barrios-Choplin, B., "Effective Leadership in TPU's: Findings from Interviews at 16 Units," Technical Report NPS-SM-96-002, July 1996.

#### **CONFERENCE PRESENTATION:**

Thomas, K.W., "The FY96 TPU Leadership Study," U.S. Army Reserve Command General Officer Commanders and Command Sergeants Major Conference, Atlanta, GA, 21-22 September 1996.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Leadership, readiness, retention, Troop Program Unit, Army Reserve

## PROJECT SUMMARIES

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### **USAR UNIT READINESS IMPACTS OF UNSATISFACTORY PARTICIPANTS**

**George W. Thomas, Professor**

**Robert Barrios-Choplin, Visiting Assistant Professor**

**Department of Systems Management**

**Sponsor: U.S. Army Studies Program**

**OBJECTIVE:** The objective of this study is to provide new and revised accessions and personnel policies for managing unsatisfactory participants in the USAR. This includes potential tools for identifying first time unsatisfactory participants and likely multiple unsatisfactory participants.

**SUMMARY:** Interviews with USAR unit commanders have been analyzed for potential means of identifying and managing unsatisfactory participants. In CY97 we will analyze USAR data to contrast satisfactory versus unsatisfactory participants and we will conduct interviews of unsatisfactory participants.

#### **CONFERENCE PRESENTATIONS:**

Thomas, George W., "Gender Conditioning and Real Men," Conference on New Masculinities, Los Angeles, CA, May 1996.

Thomas, George W., "Masculinity Across Cultures," Institute for Cultural Studies, Pahoa, HI, August 1996.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEY WORDS:** Manpower, U.S. Army Reserve, attrition, unsatisfactory participants, readiness.

### **EFFICIENT ESTIMATION OF POPULATION PROPORTIONS**

**R.A. Weitzman, Associate Professor**

**Department of Systems Management**

**Sponsor: Unfunded**

**OBJECTIVE:** This research aims at estimating population proportions from small samples or subsamples, such as might result from breaking down a moderately large sample by demographic variables.

**SUMMARY:** This research began in the early 1970s as a project supported by the Navy Personnel Research and Development Center (NPRDC). The project was originally called "pattern analysis" and produced a number of FORTRAN computer programs and NPS technical reports. The most recent product is a work submitted for publication this year and cited below in OTHER. This work provides an efficient method of estimating population proportions from small samples. The method is Bayesian and involves both point and interval estimation, different from conventional methods. In an example of the savings afforded by the method, a margin of error ( $\pm .04$ ) requiring a sample of 702 conventionally is obtainable by this method from a sample of only 285.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Survey research, estimation of proportions, measurement theory

## PROJECT SUMMARIES

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### MULTIPLE-CHOICE TESTS IN CLASSICAL AND MODERN TEST THEORY

R.A. Weitzman, Associate Professor  
Department of Systems Management  
Sponsor: Unfunded

**OBJECTIVE:** Instead of considering guessing in responding to multiple-choice items as a nuisance to be ignored or to be estimated away, this research has aimed at taking advantage of guessing in attempts to solve some of the problems of both classical and modern test theory.

**SUMMARY:** This project began in about 1967. The first product developed in 1968 and published in a technical report that year was a formula for estimating the reliability of a multiple-choice test. This work ultimately appeared in a journal article in 1984. Two subsequent works have led to the development of methods of incorporating guessing in modern test theory without losing important advantages of classical test theory. One of these works was published this calendar year, 1996, and is cited below.

**PUBLICATION:**

Weitzman, R.A., "The Rasch Model plus Guessing," Educational and Psychological Measurement, Vol. 56, No. 5, pp. 779-790, October 1996.

Weitzman, R.A., "A Measurement Approach to the Estimation of Population Proportions," (submitted).

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Multiple-choice testing, item response models, Rasch model

### PART AND PARTIAL CORRELATIONS IN STANDARDIZED TESTING

R.A. Weitzman, Associate Professor  
Department of Systems Management  
Sponsor: Unfunded

**OBJECTIVE:** Continuing a career-long interest in part and partial correlations and regression analysis, this research has aimed at developing and applying part and partial correlations in the context of test validity and test fairness in personnel selection.

**SUMMARY:** This research produced a well-received publication in the mid-eighties indicating through part-correlation analysis that the test validities of standardized tests used for college admissions might actually be considerably higher than the data appeared to show. The current research focuses on a flaw in that earlier work: The usual part-correlation formula does not apply when the control variable is categorical, rather than quantitative. The current research develops the correct formula and examines the effect of the correction on the results obtained previously. The derivations are completed; only the writing remains to be done.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Part correlation, categorical variables, Scholastic Aptitude Test

## PROJECT SUMMARIES

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### SEQUENTIAL TESTING FOR SELECTION

R.A. Weitzman, Associate Professor

Department of Systems Management

Sponsor: Unfunded

**OBJECTIVE:** This research aims at developing sequential item-sampling methods for selecting a person for school or work with pre-established error probabilities of acceptance or rejection. These methods involve the use of the sequential probability ratio test (SPRT).

**SUMMARY:** This research produced a publication in 1982. The method described in that publication required the use of large samples. The latest research on this method makes use of the Rasch model to reduce considerably the size of the samples required. This research is in progress.

**DoD KEY TECHNOLOGY AREAS:** Manpower, Personnel and Training

**KEYWORDS:** Sequential probability ratio test (SPRT), sequential testing for selection, Rasch model

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Abdel-Hamid, T.K., "The Slippery Path to Productivity Improvement," IEEE Software, July 1996.

Barrett, F.J., "The Organizational Construction of Masculine Hegemony: The Case of the U.S. Navy," Gender, Work, and Organizations, Vol. 3, No. 3, pp. 129-142, July 1996.

Bhargava, H.K., Krishnan, R., and Müller, R., "Decision Support on Demand: Emerging Electronic Markets for Decision Technologies," Decision Support Systems, Vol. 20, 1996.

Bhargava and Norris, R., "Coming Soon to Your Favorite Library: Decision Support on Demand," D-Lib Magazine, (Corporation for National Research Initiatives), <http://www.dlib.org/dlib/june96/06contents.html>, June 1996 (ISSN 1082-9873).

Bui, T., and Ramesh, B., "Decision Support: Recent Applications and Lessons Learned," Editorial to Special Issue, Journal of Decision Systems, Vol. 5, No. 3-4, 1996.

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Bui, T., and Loebbecke, "Supporting Cognitive Feedback Using Systems Dynamics: A Demand Model of the Global Systems of Mobile Telecommunication," Decision Support Systems, June 1996

Bui, T., and Shakun, "Negotiation Processes, Evolutionary Systems Design and NEGOTIATOR," Group Decision and Negotiation, November 1996, Vol. 5, pp. 339-353.

Eitelberg, M.J., "Review of Gays and Lesbians in the Military: Issues, Concerns and Contrasts," Armed Forces & Society, Vol. 22, No. 2, Winter 1996.

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Gates, W.R., and Terasawa, K.L., "Implementing Unit Costing: Efficiency in Translating Policy to Practice," Journal of Cost Analysis, 89-117, Spring 1996.

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Henderson, David R., "Canadian Wheat Farmers Want Their Freedom," Wall Street Journal, 15 November 1996.

Henderson, D.R., "The Case for Sweatshops," Fortune, 28 October 996.

Hildebrandt, G.G., and Franck, R., "Comparative Aspects of the Contemporary Military-Technical Revolution: Potential Military Rivals to the United States," Defense Analysis, Vol. 12, No. 2, August 1996.

Hildebrandt, G.G., "The Opportunity Cost of Defense Inputs," Public Budgeting and Financial Management, Winter 1996.

Kamel, M.N., McCaffrey, M.J., and Metzler, P.G., "Analysis, Design, Implementation, and Deployment of a Prototype Maintenance Advisor Expert System for the MK92 Fire Control System," Expert Systems With Applications, Vol. 10, No. 2, 1996, pp. 193-207.

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Mak and Bui, T., "Modeling Experts Consensual Judgments for New Product Entry Timing," IEEE Transactions on Systems, Man and Cybernetics, September 1996, Vol. 26, No. 5, pp. 659-667.

Mak and Bui, T., "Using Neural Networks to Modeling Scenario Analysis," Expert Systems with Applications, Vol. 10, No. 2, pp. 233-241.

Mehay, S.L., and Hirsch, B.T., "The Post-military Earnings of Female Veterans," Industrial Relations, Vol. 35, No. 2, April 1996, pp. 197-217.

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## 1996 THESIS ABSTRACTS

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### A COMPARATIVE ANALYSIS OF FINANCIAL REPORTING MODELS FOR PRIVATE AND PUBLIC SECTOR ORGANIZATIONS

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The objective of this thesis was to describe and compare different existing and evolving financial reporting models used in both the public and private sector. To accomplish the objective, this thesis identified the existing financial reporting models for private sector business organizations, private sector nonprofit organizations, and state and local governments, as well as the evolving financial reporting model for the federal government. Using archival research, the study characterized the alternative models in terms of reporting objectives, information users and their needs, accounting conventions, and the types and content of financial reports. Similarities and differences among the reporting models were identified. Broad findings include that the reporting models are generally similar in the reporting of financial condition and different in the reporting of operations. The different reporting practices follow logically from the varying objectives that financial reporting serves in the different sectors.

### IMPLEMENTATION CONSIDERATION FOR WINDOWS NT INTEGRATED NETWORK FOR SYSTEM MANAGEMENT COMPUTER LABORATORIES

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The integrated token ring LAN of the Systems Management Department of the Naval Postgraduate School is progressively moving its network platform from Microsoft Windows for Workgroups to Windows 95 Client and Windows NT Server to improve LAN performance and to meet an increasing demand from students and the faculty for the latest software applications.

This thesis is a study of configuration for the installation of Windows NT Server 3.51. An incremental installation concept is implemented throughout the installation of Windows for Workgroups, Windows 95 and applications software. Logical client-server connection has been partially implemented and tested successfully using a client running under Windows for Workgroups and client running under Windows 95 to access application on the Windows NT Server 3.51. For a sample test, the SMERFS, an MS-DOS-based application, is used in these experiments because the SMERFS is a relatively small program and does not take a long time to be accessed.

The recommendations presented include suggestions for the upgrade of the integrated token ring LAN to a Windows NT Server 3.51 with Clients using Windows 95.

### THE CHARACTERISTICS OF SUCCESSFUL MARINE CORPS RECRUITING STATIONS: LEADERSHIP AND INFORMATION SHARING

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Marine Corps recruiting duty is the toughest peacetime assignment for any Marine. It involves complex internal and external factors dealing with global, national, and local issues completely out of the control of recruiting personnel, making it a truly dynamic duty. Furthermore, recruiting is an assignment where performance is based largely on quantitative measures. Marines, at all levels, are under immense pressure to make assigned recruiting goals or be relieved from duty. The objective of this thesis is to describe the characteristics of the successful recruiting stations and define

## 1996 THESIS ABSTRACTS

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how they could reengineer through information technology. Using appreciative inquiry at the most successful recruiting stations, recruiters, noncommissioned officers in charge, and command group members are interviewed to discover and understand the factors that give life to their stations. The culture of these stations is then characterized to illustrate how they confront pressures to meet assigned goals. The outcome is that successful recruiting stations are designed for high performance and represent prime candidates to implement reengineering. Redesign through information technology offers to reduce the organizational complexity within recruiting stations thereby limiting pathologies and increasing efficiency. Recommendations are offered for further research.

### **THE THEATER HIGH ALTITUDE AREA DEFENSE PROGRAM: AN INTERIM EXAMINATION OF ITS ACQUISITION STRATEGY**

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This thesis is an examination of the Theater High Altitude Area Defense (THAAD) program's implementation of the User Operational Evaluation System (UOES) acquisition strategy. The Missile Defense Act of 1991 imposed significant schedule risk on THAAD's development, necessitating the UOES strategy. The UOES risk management issues are analyzed using DoD's risk management guidance. This guidance incorporates some current methods, applications, and trends in using prototypes during development. Using this guidance, THAAD's tailored acquisition strategy is reviewed. From this review, lessons that have been learned from the program's experience are developed. The results show that as a result of programmatic risk the UOES strategy has resulted in a delay in fielding the full THAAD objective system.

### **ANALYSIS OF POST-RETIREMENT EARNINGS AND EMPLOYMENT EXPERIENCES OF MILITARY RETIREES**

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This thesis investigates the wage and salary differentials experienced by military retirees in their post-service second career in the civilian labor market. The 1990 Census of Population and Housing, Public Use Microdata Samples was used as the source of data. Log earnings regression models were specified and estimated to determine earnings differences between military retirees and two comparison groups. The effects of the number of weeks and hours worked, education, location and receiving retirement income were controlled in the earnings regressions. The results indicate the proportion of military retirees not in the labor force is substantially higher than the proportion of non-veteran civilians or non-retired veterans not in the labor force. The data also reveals that retirees tend to work less weeks per year and hours per week. Finally, retirees earn on average \$4,347 less annually than both comparison groups. Thus, military retirees not only tend to work less but when they do work they tend to take jobs that pay less. The present value of the earnings difference between a retiree and a non-retired veteran is approximately \$48,534 (11.38 percent).

## 1996 THESIS ABSTRACTS

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### IMPLEMENTING ELECTRONIC DATA INTERCHANGE (EDI) AT THE DEFENSE FUEL SUPPLY CENTER

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Master of Science in Management-December 1995

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This thesis examines the implementations of Electronic Data Interchange (EDI) at the Defense Fuel Supply Center (DFSC). The general history and concept of EDI is discussed along with a background on DFSC. The results of surveys of DFSC's employees and DFSC's contractors are analyzed to provide insight on the barriers and impediments of implementing EDI at DFSC.

The major conclusion drawn is that DFSC can successfully implement EDI in its operations with its contractors. It was determined that the following key factors are crucial to the successful implementation of EDI in this environment: 1) selection of the proper personnel to run the program; 2) proper training of all DFSC personnel that will interface with EDI; 3) the need to advertise DFSC's EDI program to its potential trading partners; 4) ability to recognize the EDI standards that have been adopted by the petroleum industry and to comply with them; and 5) ability to recognize when and where EDI best fits in to the organization's business process, and to only implement EDI in these areas. These efforts would allow DFSC to successfully integrate EDI technology into their operations in the most efficient manner.

### FROM GREASEBOARDS TO GIGABYTES: A COMPARATIVE ANALYSIS OF NAVAL AVIATION AND COMMERCIAL AIRLINES MAINTENANCE SCHEDULING METHODS

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Advisors: Donald R. Eaton, Department of Systems Management

Keebom Kang, Department of Systems Management

In Naval Aviation maintenance organizations, planning and scheduling of preventive maintenance actions tend to be left to ad hoc and traditional methods. The aviation operations exist in a highly dynamic environment; aircraft utilization, configurations, resource constraints and operational requirements change several times a day. To ensure that quality aircraft are available for operations, changes in maintenance schedules must be performed on a continuing, iterative basis, requiring integration of numerous maintenance data bases and intensive number crunching.

Though operating in a more stable environment, commercial airlines attempt, as do Naval Aviation squadrons, to optimize aircraft utilization, mission readiness and/or maintenance yield under a set of constrained automated software systems, a few airlines have recently developed and implemented integrated decision support systems (DSS) within their maintenance information systems. This has yielded extraordinary productivity improvements.

In this thesis, the authors show that the implementation of a automated DSS, similar to those used in the airline industry, that could be integrated into the Naval Aviation Logistics Command Information System (NALCOMIS) would maximize resource utility while minimizing the impact of the numerous, ever-changing constraints. To reduce procurement lead time and minimize development risk and cost, the authors recommend the adaptation of a commercial off-the-shelf aviation-related DSS and provide a possible implementation plan.

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### USING PERFORMANCE MEASURES AND INDICATORS TO ASSESS THE QUALITY OF CUSTOMER SERVICE PROVIDED TO THE MARINE CORPS BY THE DEFENSE FINANCE AND ACCOUNTING SERVICE

**Keith Wayne Bass-Major, United States Marine Corps**  
**B.S., University of South Carolina, 1984**  
**Master of Science in Management-December 1995**  
**Advisor: Lawrence R. Jones, Department of Systems Management**

This thesis identifies the potential for using performance measures and indicators to assess the quality of customer service provided to the Marine Corps by the Defense Finance and Accounting Service (DFAS) in the functional areas of finance and accounting. Five functional areas were analyzed in the study; Military Pay, Civilian Pay, Travel Payments, Contractor and Vendor Pay, and General Accounting.

Key personnel from Headquarters Marine Corps and various comptrollers throughout the Marine Corps were surveyed to determine what performance criteria Marine Corps were surveyed to determine what performance criteria Marine Corps commanders and financial managers define as the critical components of customer service in the functional areas of finance and accounting. This information, coupled with the concept and principles of performance measurement, led to the development of a list of performance measures and indicators that the Marine Corps could use to effectively and efficiently assess the quality of customer service that DFAS provides to the Marine Corps in the functional areas of finance and accounting. Recommendations for the implementation of a performance measurement program are included.

### SURFACE WARFARE JUNIOR OFFICER SEPARATION: DOES SHIP TYPE MAKE A DIFFERENCE?

**Glenn E. Bautista-Lieutenant, United States Navy**  
**B.A., Texas A&M University, 1988**  
**Master of Science in Management-March 1996**  
**Advisors: Alice M. Crawford, Department of Systems Management**  
**Mark J. Eitelberg, Department of Systems Management**

This thesis examines the relationship between ship type and separation by Surface Warfare junior officers. The data used in this thesis were taken from the Navy's Officer Master Tapes (OMT), provided by the Center for Naval Analyses, and Officer Promotion History Data Files, collected by the Department of the Navy for all officers. A total of 8,260 officers who entered the Navy from 1976 to 1990 were analyzed by ship mission category; and an additional 2,125 officers who were screened for Lieutenant Commander from 1986-1994 were analyzed by ship mission, ship class, and individual ship. The results revealed relatively higher separation rates among officers who were initially assigned to an aircraft carrier and disparities between the proportion of officers who attained career milestones (e.g., SWO qualification, Department Head Screen, and promotions). These factors, combined with personal characteristics (such as marital status and undergraduate performance) played a larger role in the separation decision than any one single factor. Specific recommendations for further research are provided.

### THE REINVENTION OF MILITARY SEALIFT COMMAND:

#### THE CIVILIAN MARINER PERSPECTIVE

**Alice Bellafiore-Lieutenant, United States Navy**

**B.S., University of Arizona, 1988**

**Master of Science in Management-March 1996**

**Advisors: Susan Hocevar, Department of Systems Management**

**Linda Wargo, Department of Systems Management**

The purpose of this thesis is to discuss the Military Sealift Command's (MSC) reinvention from the perspective of its pool of civilian mariners (CIVMARS). It will report on and analyze data representing the CIVMAR perspective on the

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reinvention of MSC. The data addressed three main issues:

- The need for change;
- The process by which the change is being implemented; and
- Reinvention actions.

The findings were then interpreted using the appropriate change management theory, and resulted in the following conclusions:

- CIVMARS perceive the amount and types of communication and communication processes to be inadequate, and
- CIVMARS feel undervalued and excluded from MSC in general and the reinvention effort in particular.

### **THE MANAGEMENT OF THE CORPS OF PROFESSORS OF THE PHILIPPINE MILITARY ACADEMY**

**Orlando B. Beltran-Major, Philippine Army**  
**B.S., Philippine Military Academy, 1980**

**Master of Science in International Resource Planning and Management-June 1996**

**Advisors: Roger Evered, Department of Systems Management**  
**Mark J. Eitelberg, Department of Systems Management**

This is an analysis of the Personnel Management System (PMS) of the Corps of Professors of the Philippine Military Academy (CP, PMA). Executive Order- 237, Republic Act 291 and unwritten policies relevant to the CP were interpreted to answer the following questions: 1) What is the present system of recruitment, seniority, promotion, career development, utilization, and separation of the CP, PMA? 2) How is this PMS assessed in terms of the best utilization of the CP as the main academic arm of PMA? and 3) What recommendations can be offered to policy and decision-makers to improve the CP PMS?

The researcher found that the CP is not optimally utilized as the main academic arm of PMA. The present CP, PMA is governed by EO 237, RA 291 and unwritten policies. The lack of a single synthesizing point among these policies led to inconsistent application of the rules. Recruitment procedures are not spelled out. Seniority has been a nagging problem despite the lengthy provisions of EO 237 and RA 291. These two laws do not cover Career Development policies. Should a member of the CP be a scholar first or military person? On utilization, a CP member is limited to PMA. Also, policies on separation are insufficient.

Thus, there is a need to revise EO 237 and to redefine the goals of the CP. The CP, PMA must collectively develop a coherent, consistent, and long-ranged Personnel Management System. It must come up with specific implementing guidelines for recruitment, career development, promotion, and utilization.

### **A METHODOLOGY FOR UPDATING THE NAVY'S LOGISTICS FACTORS FILE**

**Raymond John Benedict-Lieutenant, United States Navy**  
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**Master of Science in Operations Research-June 1996**

**Advisor: Robert Read, Department of Operations Research**  
**Second Reader: Dan Boger, Department of Systems Management**

This thesis develops a methodology for updating the Navy's Logistics Factors File, which has been neglected in recent years and requires updating. This study is limited to Repair Parts (Class IX of the Department of Defense Supply Class Codes) for the following four classes of ships: CVN-68 (Nimitz class) Aircraft Carriers, CG-47 (Ticonderoga class) Guided Missile Cruisers, DD-963 (Spruance class) Destroyers, and FFG-7 (Oliver Hazard Perry class) Guided Missile Frigates.

The current Logistics Factors File structure includes a single data entry in pounds per unit per day to describe the sustainment requirements of these units for all of the supply classes and their respective subclasses. For Repair Parts, these values are severely understated when compared to contemporary data. These "pounds per unit per day" random variables have heavily skewed distributions. These distributions can be fitted with mixtures of standard probability

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distributions, and it seems wise to recommend that associated variability information be included either directly in the Logistics Factors File, or in a readily available companion source.

### **INTELLECTUAL PROPERTY RIGHTS IN SOFTWARE ACQUIRED BY DOD**

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**B.S., University of Vermont, 1985**

**Master of Science in Management-December 1995**

**Advisor: Mark W. Stone, Department of Systems Management**

This research reviews the intellectual property rights in software acquired by the Department of Defense (DoD). The intent of the study is to analyze the effectiveness of the DoD's policy concerning noncommercial software intellectual property rights. Surveys were developed to assess the current policy. Contracting officials in the military and commercial sector were the respondents to the interviews. The conclusions based on this research are that contracting officers do not fully understand the myriad of intellectual property rights management tools at their disposal. The research also uncovered the perception that DoD's overall policy in this area is fragmented and confusing. Recommendations include: (1) acquisition and contracting students of Federal acquisition programs should receive instruction in ADP or FIP (Federal Information Processing) acquisition, (2) acquisition and contracting students of Federal acquisition programs should receive increased class sessions on intellectual property rights, (3) DoD contracting personnel should increase usage of "specifically negotiated license rights" in software contracts, and (4) DoD contracting personnel should strengthen software contract solicitations.

### **ANALYSIS AND UTILIZATION OF FINANCIAL MANAGEMENT**

### **GRADUATES FROM THE NAVAL POSTGRADUATE SCHOOL**

**Steven H. Blaisdell-Lieutenant Commander, United States Navy**

**B.S., Auburn University, 1983**

**Master of Science in Management-June 1996**

**Advisors: John E. Mutty, Department of Systems Management**

**Jerry L. McCaffery, Department of Systems Management**

In the present era of fiscal austerity, the need for postgraduate education and the role of NPS has been closely scrutinized for their relevance to Navy and DoD objectives. The primary focus of this thesis was to determine if the Navy has been effectively utilizing NPS Financial Management graduates. A sample population of NPS Financial Management graduates, from the years 1981 to 1985, was career tracked up through 1995 for purposes of determining utilization and retention. Utilization rates, i.e., the percentage of officers that complete a payback tour, were further determined for each officer community within the population. Cohort files, built from yearly Navy Officer Master File (OMF) extracts, provided the data for this population. Analysis of the utilization and retention rates indicates that the Navy is getting a good return on its graduate education investment. Staff Corps officers achieved the highest utilization. Unrestricted Line and Restricted Line officers, while utilized at lower rates because of career considerations associated with their primary warfare specialty, nevertheless bring invaluable operational experience and perspective to critical Financial Management billets.

### **PREDICTING NAVAL AVIATOR ATTRITION USING ECONOMIC DATA**

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**B.A., Syracuse University, 1979**

**Master of Science in Management-December 1995**

**Advisor: O. Douglas Moses, Department of Systems Management**

Understanding and accurately predicting attrition is vital to correctly managing the retention of naval aviators. This thesis investigates the ability of models incorporating a number of economic measures to predict naval aviator attrition

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rates. Using data from 1978 to 1990, this study examined a wide range of potential economic explanatory variables and their effects on naval aviator attrition rates. The naval aviator data set was grouped into six populations, separated by aviation community (helicopter, jet and propeller) and by years of service (5-8 and 9-12). Three separate linear regression models for each of the aviator groups were developed, and their predictive ability evaluated. The study found that: no single model was best at predicting attrition rates for all groups; simple models using one or two variables performed better than complex, multivariate models; the most useful predictor variable was the national unemployment rate; attrition rates with the highest levels and variability were in the jet and propeller pilot groups with five to eight years of service, and the most significant models, able to outperform a naive prediction, were found for these groups.

### **AN ANALYSIS OF THE ORDNANCE OFFLOAD/ONLOAD COSTS OF PACIFIC FLEET LARGE DECK AMPHIBIOUS ASSAULT SHIP (LHA AND LHD) HOMEPORTED IN SAN DIEGO**

**Martin E. Bouveron-Captain, United States Marine Corps**

**B.A., Linfield College, 1981**

**Master of Science in Management-December 1995**

**Advisor: William R. Gates, Department of Systems Management**

This thesis uses total cost and external safety considerations to determine the most cost effective and safest method of embarking/debarking ordnance to support the Pacific Fleet. The study relies on historical data and spreadsheet-based Monte Carlo simulations to estimate operation times. Simulation is required because few operations have been conducted so historical data is limited. The "add-in" package, "Crystal Ball," applies stochastic simulations to decision making analysis. The actual costs of anchorage and vertical replenishment (vertrep) operations are compared, using triangular and uniform distribution models. This thesis provides a more accurate cost analysis for comparing onload/offload vertrep and anchorage operations. The finding from this comparison determined that vertreps provide the largest benefit to the fleet in terms of cost, training, and flexibility.

### **RESTRUCTURING MILITARY OPERATIONS AT NPS TO BETTER MANAGE BASE OPERATIONS SUPPORT**

**Mark E. Bower-Lieutenant Commander, United States Navy**

**B.S., Wright State University, 1983**

**Master of Science in Management-December 1995**

**Advisor: Nancy C. Roberts, Department of Systems Management**

This thesis used action research to make restructuring recommendations for the Director of Military Operations (Code 04), Naval Postgraduate School (NPS). The restructuring recommendations were provided to assist Code 04 in managing Base Operations Support (BOS) it provides to the Presidio of Monterey (POM) and other activities.

Following the closure of Fort Ord, BOS for the POM shifted from Fort Ord to NPS. This created some of the largest and most complex Interservice Support Agreements (ISAs) in DoD. Because of the size and scope of the ISAs, a much more complex organizational relationship exists between Code 04, the POM, and other supported commands. This complex organizational relationship has caused coordination problems and overloaded Code 04.

The criteria used to make restructuring recommendations were the cost associated with the restructuring and the congruence of the organization restructure with its environment.

The central recommendation is that NPS should include an integrator function under Code 04 to coordinate and control the development and execution of ISAs.

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### IMPLEMENTING A LAN THAT INTERFACES WITH THE DMS AND USES MISSI

Lawrence Jay Brachfeld-Lieutenant, United States Navy

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Master of Science in Information Technology Management-March 1996

Advisors: Rex Buddenberg, Department of Systems Management

Gus Lott, Department of Electrical and Computer Engineering

The Defense Message System (DMS) is being implemented throughout the Department of Defense and will replace AUTODIN for individual and organization messages by the year 2000. The Naval Security Group Detachment, Monterey and any other command that sends or receives organizational or individual messages must be ready to implement DMS on their Local Area Network. This thesis fully describes the Defense Messaging System standards and components and details what needs to be implemented in a Local Area Network in order to be prepared for the initial operating capability of the DMS, scheduled for July, 1996.

### EVALUATING KNOWLEDGE BASED SOFTWARE DEVELOPMENT TOOLS

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Advisors: Balasubramaniam Ramesh, Department of Systems Management

William Haga, Department of Systems Management

Empirically evaluating software development tools to investigate their strengths and weaknesses as used in the DoD is not easy or commonplace today. Empirical evaluations are especially important while introducing new technologies such as the knowledge based software development tools, which aim at significantly improving the software development process and productivity. This study investigates a variety of methods used to evaluate new software development tools and gives recommendations on how to proceed using the following four methods: (1) case study, (2) survey, (3) formal experiment, and (4) benchmark inspection. A usability evaluation of a tool is conducted to highlight various aspects of a rigorous evaluation. Conclusions drawn from this evaluation show the importance in selecting an appropriate sample group as well as the effort required to achieve a rigorous evaluation. Indications/Recommendations for conducting rigorous evaluation of knowledge based software development tools are provided. Evaluating a new software technology after it has already been introduced to an organization is an indication to consider using a field survey, whereas evaluating two or more technologies as a basis for selection is an indication to use formal experiment in collecting data. Recommendations such as: using a control group, pre- and post-testing groups, and using video capture help to assure causality threats are mitigated.

### COST ANALYSIS OF RECAPITALIZING MARINE LIGHT ATTACK HELICOPTER ASSETS: A CASE STUDY

Conrad Nelson Brown, Jr.-Major, United States Marine Corps

B.S., United States Naval Academy, 1984

Master of Science in Management-December 1995

Advisor: Shu S. Liao, Department of Systems Management

This thesis focuses on the development of a spreadsheet model that can be used by acquisition personnel to forecast the life-cycle costs of a weapon system under consideration for acquisition. It involves a case study of a major weapon system acquisition, helicopters for Marine Light Attack Helicopter Squadrons, which provides the basis for the model. The life-cycle costs used are limited to the cost of operating and supporting the system once it has been deployed and represent the most significant costs incurred during the system's life-cycle. In an effort to assist the Program Manager in the decision-making process, decision analysis techniques are introduced. An "add-in" simulation software package allows the assumptions upon which the cost-estimates are based to take on a more realistic stochastic nature. From the simulation trial runs, distribution frequencies are generated which enable the cost analyst to establish a future cost with

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a higher probability of occurrence. Cost sensitivity analysis is also used to provide the Program Manager with a mechanism for establishing which assumptions have the greatest impact on costs and what happens when those assumptions are varied. The major finding of the thesis is that these decision analysis techniques can significantly aid the Program Manager in the decision-making process.

### **PRICING INFORMATION SERVICES IN ELECTRONIC MARKETS:**

#### **CASE STUDY OF DECISIONNET**

**David G. Brownlee-Lieutenant, United States Navy**

**B.B.A., Texas Technology University, 1986**

**Master of Science in Information Technology Management-March 1996**

**Advisor: Hemant K. Bhargava, Department of Systems Management**

The Internet has experienced rapid growth since its beginning as a government-funded communications network. This growth has partially contributed to the explosion of commerce on the net. One example of services offered on the Internet is DecisionNet. It provides an electronic environment of decision support and modeling technologies. The purpose of this thesis is to design an equitable pricing scheme for those on-line information service providers. DecisionNet is used as a case study to describe the pricing policies.

Service pricing over the Internet is still in its infancy. As a result there is not one set model for pricing Internet services that can directly be applied to applications such as DecisionNet. The pricing strategy should be based both on pricing theory and industry practices (pertaining to services). This thesis has taken this approach. Research was also conducted on the United States Government's acquisition process. This was necessary because the government is expected to be a major consumer of on-line information services.

This thesis has proposed a simple yet effective pricing policy which is designed to recoup both the fixed and the variable costs associated with providing information services over the Internet. The policy is based on the strategy of market segmentation. The segments have been broken into four areas and further subdivided based on numbers of users and level of usage. Suggestions have also been made in regards to how to recoup both the fixed costs and the variable costs.

### **A CASE ANALYSIS OF THE DUAL SOURCING STRATEGY AS USED IN THE ACQUISITION OF THE ARMY'S JAVELIN MEDIUM ANTI-ARMOR WEAPONS PROGRAM**

**Christopher S. Buck-Captain, United States Army**

**B.S., University of Arkansas, 1985**

**Master of Science in Management-December 1995**

**Advisors: John T. Dillard, Department of Systems Management**

**Mark W. Stone, Department of Systems Management**

The use of competition during the acquisition of major weapon systems is a key ingredient to mitigating risk and reducing total program costs. One tool the program manager (PM) has at his disposal to ensure competition is viable to is dual sourcing. Since the 1960's, PMs have continuously considered the advantages and disadvantages of dual sourcing when developing their acquisition strategy.

In the large procurements of the late 1970's and 1980's dual sourcing paid big dividends in reducing program costs and mitigating risks in schedule and performance. However, in the past few years dual sourcing as an overall program strategy has come close to being abandoned. Sole source procurement, especially in the production phase of major weapon systems, has returned as the norm. It appears the cause for this can be directly traced to the large force draw-downs, reduced budgets and decreased quantity requirements of the 1990's.

The Army's Javelin program, which began in the 1980's, developed its acquisition strategy around the use of dual sourcing. Dual sourcing within this program has focused both on the overall program level (macro) and at the subcomponent level (micro). The lessons learned and techniques used in this program may provide useful insight for other PMs considering the use of dual sourcing, or within programs facing budget cuts or program downsizing.

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### STANDARDIZED ACCOUNTING ASHORE FOR AFLOAT ACTIVITIES

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B.A., Saint Leo College, 1985

Master of Science in Management-June 1996

Advisors: James M. Fremgen, Department of Systems Management

Louis G. Kalmar, Department of Systems Management

Within limited resources and reduced funding for Naval forces, there is a need to standardize accounting ashore for all afloat activities. The purpose of this thesis was to review the framework for standardization of inventory reporting afloat under one stores (inventory) accounting system, referred to as the Material Financial Control System-Retail (MFCS-Retail). Additional analysis was conducted on general funds obligational reporting for afloat Operating Targets (OPTARS) and the conversion to the Standard Accounting and Reporting System, Field Level (STARS-FL) system. Empirical research was conducted at DFAS Operating Locations in San Diego, California and Norfolk, Virginia to review existing stores accounting and general funds management procedures. Additionally, financial reconciliation procedures were reviewed for inventory and financial accounting, with the goal of using artificial intelligence to reduce unmatched receipts and expenditures. Emphasis was placed on areas that could be streamlined and automated to provide timeliness in reporting, while reducing workload afloat. The major finding of this research was that standardizing accounting for inventories afloat under MFCS-Retail and STARS-FL for OPTAR management allows for streamlining detailed inventory management and financial reporting ashore. A major benefit is the reduction of workload afloat through the standardization of reporting across the fleet.

### COST-BENEFIT ANALYSIS OF OBSTETRICAL/GYNECOLOGICAL PHYSICIANS WHO ACCEPT ACTIVE DUTY PATIENTS ON THE MONTEREY PENINSULA

Tracy L. Butterfield-Lieutenant, United States Navy Reserve

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Master of Science in Management-March 1996

Advisor: William Gates, Department of Systems Management

With major shifts in military health care, more active duty members are being seen by civilian physicians. This thesis examines Obstetrical care for active duty service members on the Monterey Peninsula. The central objective of this study was to analyze incentives for civilian Obstetrical/Gynecological physicians to accept active duty patients. To address this issue, interviews were conducted of contracted and non-contracted Obstetrical/Gynecological physicians on the Monterey Peninsula. The interviews obtained information about the physician's costs and benefits for accepting active duty patients. Additionally, with the payment for an active duty member's medical treatment care being closely linked to Medicare rates, the interview data was compared to studies on barriers to prenatal care for low-income patients. The major findings were that the major disadvantage to accepting active duty patients is not that the military pays for health care at a discounted rate. The major disadvantage for physicians to accept active duty patients is the volume of paperwork and claims filing associated with being a contracted physician. The primary benefit the physicians receive by accepting active duty patients is the additional volume of patients.

### CRITICAL PATH MANAGEMENT FOR CONSTRUCTION OFFICES

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Master of Science in Management-December 1995

Advisor: James M. Fremgen, Department of Systems Management

The objective of this thesis is to increase efficiency in the administration and control of defense construction contracts managed by Resident Officer In Charge of Construction offices. There are very few tools to guide the project managers in the field, where the design and construction is actually taking place, thus, they improvise individually in ways that may be inefficient. The major focus of this thesis is to explain critical path management and how it can help the project

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manager reduce costs, reduce time delays and increase quality. All the needs of a typical construction contract are summarized in a network schedule, using project management software to organize and control all the tasks in a project. The model is illustrated by applying it to an actual Navy construction contract. The costs and benefits of using the current methods of administration and the critical path management method using the model are then compared.

### **AN ANALYSIS OF UNITED STATES MARINE CORPS CONTRACTING DURING OPERATIONS DESERT SHIELD AND DESERT STORM**

**Gregory R. Caldwell-Major, United States Marine Corps  
B.B.A., Texas A&M University, 1984**

**Master of Science in Management-December 1995**

**Advisor: Rebecca J. Adams, Department of Systems Management**

The purpose of this study was to document United States Marine Corps contracting and procurement activities during Operations Desert Shield and Desert Storm. This was accomplished by examining who was there, how they were organized, and in what type of actions the contracting and procurement professionals were involved. The researcher evaluated these areas to determine not only what improvements can be made, but also what should not be changed.

The results of this study indicates that the Marine Corps needs to examine the following areas: the current organization of Marine Corps contracting, hardware and software requirements of contingency contractors, legal officer requirements, and the training and education needs of the contracting workforce. This study also recommends changes to the structure and organization of current contracting units, the standardizing of software used by the various contingency contracting organizations, the identification qualified legal officers to be deployed for contingencies, training for both contractors and senior commanders and the use of the lesson learned system to document contracting operations.

### **INFRASTRUCTURE CONSIDERATIONS FOR WORLD WIDE WEB SERVERS**

**John T. Caller-Lieutenant Commander, United States Naval Reserve  
B.S., University of South Carolina, 1979**

**Master of Science in Information Technology Management-June 1996**

**Advisors: Hemant Bhargava, Department of Systems Management  
Suresh Sridhar, Department of Systems Management**

This thesis explores issues associated with defining and selecting infrastructure requirements for World Wide Web sites. The explosive growth of the WWW has made it the largest single service on the Internet. With this growth comes a need for guidance to organizations or individuals desiring to establish new Web sites. This thesis provides the guidance needed to define a potential site's requirements and select the infrastructure necessary to fulfill those requirements.

A combination of literature review of current books and periodical, as well as surveys of WWW sites was used to obtain information. This information was used to develop the framework for defining requirements. A rule based heuristic was also adopted from the literature and subsequently validated. It is used to select the computing hardware needed for a site.

A key lesson learned is that most organizations do not conduct initial requirements analysis to determine a site's infrastructure needs. The reasons range from oversight to indifference. The potential penalty for not conducting proper assessment of requirements is the same as for any venture, a substandard product and poorly leveraged investment.

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### REENGINEERING DOD THROUGH ENTERPRISE-WIDE MIGRATION TO OPEN SYSTEMS

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Master of Science in Information Technology Management-September 1996

and

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Master of Science in Information Technology Management-September 1996

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Barry Frew, Department of Systems Management

The Department of Defense cannot afford to develop and deploy information systems that have no growth potential. Legacy systems must be replaced with flexible, highly interoperable systems that produce high residual values. With shrinking budgets, depreciation of exiting hardware, and rising maintenance of legacy systems, organizations must deploy systems that are capable of evolving with changing business requirements.

The Department of Defense enterprise vision for information management (IM) emphasizes integration, interoperability, flexibility, and efficiency through the development of a common, multi-purpose, standards-based technical infrastructure. This vision requires a new paradigm for building information systems.

The new paradigm relies on open systems, which make it easier, less expensive, and faster to develop and change applications and to employ new technology features. This research examines open systems and provides a strategy for organizations to migrate to them. A case study of the Naval Postgraduate School illustrates the strategy. Provisionally, a prototype application models the desired characteristics of an open system.

### A MODEL IN DEFENSE REUTILIZATION: PRESIDIO OF MONTEREY AND FORT ORD

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B.S., Illinois State University, 1985

M.A., Webster University, 1993

Master of Science in Management-December 1995

Advisors: Rebecca J. Adams, Department of Systems Management

Sandra M. Desbrow, Department of Systems Management

The Base Realignment and Closure (BRAC) process has impacted people and cities throughout the United States. Many municipalities are directly affected by base closures that occur within their borders. Of major concern to those cities and states is the economic impact a base closure will have on their local economies. In an effort to prevent bases from being closed many city and state officials and private citizens have turned to Federal officials for assistance. The Monterey Peninsula is one of the communities affected by the BRAC process, with the closure of Fort Ord and the recommended closure of the Defense Language Institute (DLI). The primary reason DLI was slated for closure by BRAC was excessive Base Operation Support (BASEOPS) Costs. The City of Monterey adopted a unique alternative approach to prevent the closure of DLI. Monterey City officials developed a proposal to provide these costly BASEOPS services with the existing City infrastructure and presented it to the Department of Defense (DoD). This thesis will analyze this proposal, assess its feasibility and propose other contractual alternatives to reduce BASEOPS costs. The objective of the research is to present and evaluate possible alternatives for acquiring BASEOPS services and to recommend the most effective method to control BASEOPS costs. Perhaps this information can be used to prepare for future BRAC-type assessments of DLI to prevent its closure.

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### THE USE OF FINANCIAL SCORING MODELS FOR THE PREDICTION OF BUSINESS FAILURE: IMPLICATIONS FOR DEPARTMENT OF DEFENSE FINANCIAL ANALYSIS

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**B.S., Pennsylvania State University, 1984**

**Master of Science in Management-June 1996**

**Advisors: O. Douglas Moses, Department of Systems Management**

**Shu S. Liao, Department of Systems Management**

The purpose of this thesis is to improve the financial analysis of private sector firms as conducted within the Department of Defense by applying knowledge from the literature related to the use of financial scoring models to predict business failure. First, an original, six-dimensional framework was developed for thoroughly analyzing the literature related to financial scoring models. Second, using the framework, the literature was comprehensively evaluated to assess the state of the art in the use of financial scoring models to predict business failure. Third, the state of financial analysis of private sector firms within DoD was reviewed, both the activities and the methods. Fourth, the literature related to financial analysis within the DoD context was evaluated. Finally, recommendations were made to improve DoD financial analysis based upon the findings in the literature. Those recommendations include a reexamination of the definition of failure and the identification of variables that accurately predict that definition, and the need to construct defensible models.

### REVOLUTIONIZING ARMY USAGE OF MODELING AND SIMULATION AS AN ELEMENT OF ACQUISITION REFORM

**Craig H. Carson-Captain, United States Army**

**B.A., University of Virginia, 1984**

**Master of Science in Management-December 1995**

**Advisor: John T. Dillard, Department of Systems Management**

This thesis examines the use of modeling and simulation (M&S) technology in streamlining the Army's acquisition process by comparing it to commercial use of M&S. It establishes that the Army views M&S as anything short of combat and that it plays an integral part as a tool in mitigating risk in the acquisition process. The Army has recognized some areas for improving its use within the current acquisition framework. In comparison, the best business in the commercial sector have adopted M&S technology as a cornerstone to improving their entire acquisition process. They use M&S not just as a tool but as a foundation, linking a variety of functions together. This integrated M&S system linked with a horizontal management structure and flexible, three-phase process provides the synergy to field new products in less time and cost than previously. The Army could use M&S technology to improve acquisition practices if it adopted a three-phase acquisition process and a linked M&S system.

### TQL IMPLEMENTATION PROCESS IN THE U.S. NAVY: A CASE STUDY ONBOARD THE USS CARL VINSON, AND ITS APPLICABILITY TO CHILEAN NAVY WARSHIPS

**Roberto P. Carvajal-Commander, Chilean Navy**

**B.S., Chilean Naval Engineering School, 1980**

**Master of Science in Management-June 1996**

**Advisors: Roger D. Evered, Department of Systems Management**

**Linda E. Wargo, Department of Systems Management**

Two of the main aspects that preclude a Navy from engaging in a quality management philosophy, like Total Quality Leadership (TQL), are the uncertainty related to the applicability of that philosophy in a warship environment and the potential negative effects the philosophy might have on the values and beliefs that characterize a Navy. To address these issues, this thesis assesses the TQL implementation process onboard the *USS Carl Vinson* and from that experience analyzes how a quality management approach like TQL would fit in the Chilean Navy warship environment. Using personal interviews, written questionnaires to top leadership and the crew, a case study of the implementation

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process onboard the *USS Carl Vinson* was developed and then analyzed using Dr. W.E. Deming's philosophy of management, in particular his Fourteen Points. The Chilean Navy culture and its warship environment were described and then analyzed in the light of the experience onboard the *USS Carl Vinson* to determine the applicability of TQL in Chilean warships. Conclusions and recommendations from the research are expected to be helpful for the Chilean Navy as well as for the *USS Carl Vinson*.

### **TENETS FOR LEAN U.S. ARMY PROJECT MANAGEMENT OFFICES**

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**Master of Science in Management-June 1996**

**Advisor: Orin E. Marvel, Command, Control, and Communications Academic Group**

**Michael W. Boudreau, Department of Systems Management**

Secretary of Defense William Perry directed DoD to develop a restructuring plan for the acquisition organization to accomplish a personnel reduction, reduce the acquisition process costs, and eliminate activities that are either unnecessary or not cost-effective. To this end, DoD and the Services initiated acquisition reforms aimed at changing the management and conduct of research, development and acquisition projects and more closely emulate world-class commercial companies' best practices. Objectives at the heart of these initiatives are to increase product quality and user satisfaction, decrease cycle times and costs, obtain predictable results, and reduce Government acquisition management overhead. This research examined the current state within the Army PMOs, the current environment in which Army PMOs operate, and the significant policies that influence the Army PMO organizational designs. The research examined world-class commercial corporations and military project management processes and the author interviewed project management personnel to identify the minimum core PMO processes and responsibilities, characterize opportunities that might meet the goals and objectives to obtain lean PMOs, and develop a supporting set of tenets. The results of this research can be used as a guide for the challenges faced in the ensuing organizational redesign efforts in the Army.

### **DEVELOPMENT AND IMPLEMENTATION OF AN INFORMATION SYSTEM FOR THE NAVAL POSTGRADUATE SCHOOL INTERNATIONAL PROGRAMS OFFICE**

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**Master of Science in Information Technology Management-September 1996**

**Advisors: James C. Emery, Department of Systems Management**

**Magdi N. Kamel, Department of Systems Management**

The Naval Postgraduate School (NPS) International Programs Office's (IPO) mission requires timely, accurate, and intensive information exchange with the outside military and civilian agencies to accomplish the goals of the Security Assistance and the Information Programs. Therefore its information infrastructure is becoming a vital key to the organization's success or failure in performing its mission-critical tasks. Currently the office achieves its goals to a great extent without taking advantage of an information system to support its administrative activities more efficiently.

This thesis conducts a thorough analysis and documentation of the information requirements of the Naval Postgraduate School International Programs Office. Based on the requirements identified, the thesis develops and implements a series of functional computer applications which supports the NPS IPO administrative activities.

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### DESIGN AND IMPLEMENTATION OF A WORLD WIDE WEB CONFERENCE INFORMATION SYSTEM

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**Master of Science in Information Technology Management-September 1996**  
and

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**Master of Science in Information Technology Management-September 1996**

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**Kishore Sengupta, Department of Systems Management**

The Asilomar Conference on Signals, Systems and Computers is a technical conference dealing in signal and image processing, communications, sensor systems, and computer hardware and software. Sponsored by the Naval Post-graduate School and San Jose State University, in cooperation with the IEEE Signal Processing Society, the conference is held annually at the Asilomar Conference Facility in Pacific Grove, California. Although the Asilomar Conference is oriented toward computers and new technology, it has yet to exploit the full capabilities of the Internet.

The purpose of this thesis is to: a) Analyze the processes involved in the Asilomar Conference on Signals, Systems, and Computers, b) Improve the article submission and review process, c) Outline a target information system, and d) Implement a portion of the target system.

Two major portions of the target system are implemented using an IBM compatible PC: 1) the ability for authors to submit abstracts and summaries via the Internet, and 2) to allow conference administrators to manage the database via the Internet. Dynamic World Wide Web pages are created using Borland Delphi as the programming base, O'Reilly's WebSite as the web server, and two Common Gateway Interface elements for Delphi recently developed by Ann Lynnworth of HREF Tools Corp. The portions implemented lay the foundation for a system that could revolutionize the way conferences are conducted by unleashing the power of the Internet.

### THE SOCIOTECHNICAL DYNAMICS OF A TRAVEL MANAGEMENT REENGINEERING PROJECT

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and

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**James Emery, Department of Systems Management**

This thesis examines the travel management reengineering project of one DoD command. It analyzes the process selection, redesign, and implementation of the travel project and discusses the managerial implications of the project.

A review of process innovation, reengineering, and planned-change literature provides a framework for exploring the activities of the reengineering team, but semi-structured interviews and personal observations of project participants were the major source of data for the analysis.

The analysis is completed with a comprehensive look at lessons learned from the project. The research concludes that the travel management project required senior management participation and guidance, the active involvement of all project team members, and an appreciation for the natural reactions of the intended users of the new process.

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### **A COMPARATIVE FINANCIAL ANALYSIS OF THE U.S. DEFENSE INDUSTRY DURING THE POST COLD WAR DEFENSE DRAWDOWN**

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**B.S., Valdosta State College, 1981**

**Master of Science in Management-December 1995**

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**Gordon E. Louvau, Department of Systems Management**

The on-going defense drawdown has left leaders in both Government and industry concerned over the survival of the U.S. defense industrial base. The purpose of this thesis is to explore whether or not such concern is warranted, given the various strategic efforts undertaken by the management of U.S. defense firms to ensure that their companies remain competitive, profitable, and financially viable despite shrinking defense budgets. Using eight different financial ratios as performance measures of solvency, efficiency, and profitability, this thesis examines the financial viability of 28 defense contractors from 1986 through 1994. Graphical and statistical analytical techniques are used to: identify ratio trends; measure defense industry performance compared to U.S. manufacturing industry averages; and identify the relationship between defense firms' strategic commitment to/dependence on defense business and their financial viability over the period of the defense drawdown. The thesis concludes that the solvency ratio trends show steady to improving conditions, while the trends for efficiency and profitability ratios are somewhat mixed. Analysis also shows that, compared to the U.S. manufacturing industry at large, the defense industry was less solvent, less efficient, and more profitable over the period of the drawdown. However, the more defense-dependent firms were generally more solvent, more efficient, and less profitable than defense firms whose strategies indicated less dependence on defense business.

### **CAPITATION BASE RESOURCE ALLOCATION: DOES IT PROVIDE THE NECESSARY FINANCIAL INCENTIVES FOR THE MTF TO ACHIEVE TECHNICAL AND ALLOCATIVE EFFICIENCY?**

**Anthony S. Chavez-Lieutenant, United States Navy**

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**Master of Science in Management-December 1995**

**Advisors: William R. Gates, Department of Systems Management**

**James A. Scaramozzino, Institute of Defense Education and Analysis**

This thesis analyzed the effect capitation based resourcing has on the incentives for the commander of military treatment facilities (MTFs). Specifically, what incentives do MTF Commanders have to increase effectiveness and efficiency in a capitated system? In answering this question, factors such as the ability of the Commander to contract out services and the proper mix of services to maximize the value to patients while maintaining the quality of care within the capitated constraint were discussed. The mechanism for determining the capitated rate and how Bid Price Adjustment and transfer payments affect incentives were reviewed. These characteristics were analyzed to determine whether capitation in BUMED provides the necessary market incentives to achieve technical and allocative efficiency. After comparing the incentives in BUMED to the incentives in civilian sector capitation, it is unclear if BUMED will achieve similar results.

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### **AN FDDI-BASED SOLUTION FOR THE SYSTEMS MANAGEMENT DEPARTMENT COMPUTER LABORATORY NETWORK**

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FDDI is one of the latest evolutions in shared-media technology. Originally intended as a high-speed backbone for interconnecting networks, it has become a viable alternative for organizations that seek better response time and bandwidth capacity from their local area networks (LANs). However, this fiber-based standard is an expensive departure from the more familiar, and perhaps more mature, IEEE 802 token-ring and Ethernet standards. Thus, developing an FDDI-based network may present considerable economic and technical risk to an organization.

This study examines the application of FDDI technology as an upgrade to the Systems Management Department's token-ring network. It reviews the protocols that comprise the standard, addresses design considerations for developing an FDDI network, evaluates the existing token-ring LAN, and proposes an FDDI solution. This study concludes that the risks of implementing an FDDI-based upgrade, can be mitigated using an evolutionary design strategy.

### **A MODEL FOR EVALUATING PROPOSALS FROM MULTIPLE VENDORS WHICH HAVE DIFFERENT PRICES AND LEAD TIMES**

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This thesis presents a PC-based Best Value model which can be used to evaluate up to three vendor proposals for manufacture of a consumable secondary item. This software is designed to run on EXCEL 5.0 or equivalent applications. Both bid price and production lead time for a given order quantity are considered. The model calculates the minimum expected total annual inventory management costs associated with the item for each vendor. These costs include ordering, holding, backordering, and procurement costs of the item. This thesis provides the mathematical development of the model, illustration of the calculations, and a user's guide for the program. This thesis also compares the current Navy's Flexible Computer-Aided Manufacturing (FCIM-DSS) model with the Best Value model.

### **AN IMPROVED SYSTEM FOR OPERATIONAL READINESS**

#### **REPORTING FOR THE ROC ARMED FORCES**

**Jin-Tyan Chiou-Major, Republic of China Army**  
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**Master of Science in Management-June 1996**

**Advisors: Shu Liao, Department of Systems Management**  
**Daniel R. Dolk, Department of Systems Management**

This study examines readiness measurement systems in both the U.S. and the Republic of China (ROC). The purpose of the study is to suggest a new readiness measurement system for the ROC. After the Introduction, the geopolitical position of the ROC is examined to determine likely missions for the ROC Armed Forces. Next, the current readiness measurement systems used in the U.S. and the ROC are surveyed. Chapter IV presents a proposed system for measuring readiness based on expert system technology. The final chapter presents conclusions and recommendations for a readiness measurement system.

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### AN ANALYSIS OF OFFICER SEPARATION IN THE ARMY

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Master of Science in Management-March 1996

Advisors: Natalie J. Webb, Defense Resources Management Institute

Mark J. Eitelberg, Department of Systems Management

This thesis analyzes factors that influence an officer's decision to separate from the Army, after his or her initial obligation, and prior to completing 11 years of service in active duty. Data utilized in this thesis were obtained from the Defense Manpower Data Center (DMDC) Master and Loss Files. Logit models were estimated for officers who entered the Army as an O-1 in 1977, 1980, and 1983. The study also looks exclusively at officers from the three major sources of commission: U.S. Military Academy, Reserve Officers Training Corps, and Officer Candidate School. The results show that the most statistically significant factors affecting an officer's separation decision are the officer's education level and Military Occupational Specialty. The overall results also suggest that female and minority officers had an increased likelihood of leaving the Army during the military drawdown. Recommendations for further study are included.

### DATA AND MODEL MANAGEMENT FOR THE JOINT WARFARE EXPERIMENTAL PROTOTYPE

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This thesis describes a new data management design for the *Joint Warfare Analysis Experimental Prototype (JWAEP)*, a joint theater level, low resolution stochastic simulation developed at the Naval Postgraduate School. The design calls for (1) a 32 bit Windows program to access the JWAEP data which is stored in a SQL database server, (2) direct output of the database information into the plain text input files on the Unix host machine, and (3) remote execution of the JWAEP model via the network.

The viability of this design is demonstrated in the JWAEP Management Information System (JMIS) prototype program. JMIS is shown to be capable of achieving the stated design features; however, due to the size of the JWAEP database, it has not provided a full implementation of each of the design features. In addition, this thesis discusses the issues that have to be considered to maintain JMIS in synchronization with future developments in JWAEP.

### SMALL BUSINESS AND ENVIRONMENTAL CLEANUP AT FORT ORD, CALIFORNIA

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Advisor: Sandra M. Desbrow, Department of Systems Management

This thesis examines the problems facing small businesses in the Monterey, California area, that are preventing them from receiving a greater share of the Government's environmental cleanup contracting dollars. The closure of military installations has increased the emphasis on environmental cleanup, which in turn has created many opportunities for small businesses. The Army plans on spending at least \$240 million in the next 10 years on environmental cleanup of Fort Ord. This amount could very well increase as the environmental cleanup progresses and additional problems are encountered. An analysis of the current contracting process and the actions of contractors and small businesses associated with the clean-up of Fort Ord, was conducted to determine the barriers to entry into Government contracting. Data were collected utilizing personal interviews with experienced professionals at the Corps of Engineers, District Headquarters and field office, numerous public meetings relating to Government contracting and the environmental cleanup at Fort Ord, and interviews with small business owners. Conclusions were drawn from the analysis of these data, and

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recommendations for the resolution of the problems were presented in an attempt to improve small businesses' opportunity to receive Government contracts or subcontracts.

### **THE USE OF SIMULATION TO EVALUATE INVENTORY MODELS FOR MANAGEMENT OF HAZARDOUS MATERIALS**

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**and**

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A problem for the Navy Supply System is identifying the proper inventory model for managing a Hazardous Material Minimization Center. This thesis analyzes three recently proposed inventory models: two continuous review economic order quantity (EOQ) inventory models and a periodic review inventory model. Based on this analysis, the authors develop both a continuous review EOQ model and a periodic review model for evaluation. These models differ from the previous ones in that they comprise all of the relevant hazardous material inventory costs including extension of shelf-life. The two new models are then evaluated through the use of simulation. A base set of data was first used in simulating both models. This was then followed by four additional simulated scenarios providing sensitivity analyses of demand-related changes to each model. The thesis' analysis focuses on total variable costs as the primary tool for evaluating the models. The results in all cases were very close, suggesting that it can be left to the inventory managers as to whether to use a continuous review or periodic review model. Additional testing with actual demand data is strongly recommended before any implementation of either model.

### **TECHNOLOGY TRANSFER OF THE COMPUTER-AIDED PROTOTYPING SYSTEM (CAPS)**

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**Master of Science in Information Technology Management-September 1996**

**Advisors: Luqi, Department of Computer Science**

**Barry Frew, Department of Systems Management**

The inability of the Department of Defense (DoD) to accurately and completely specify requirements for hard real-time software systems has resulted in poor productivity, schedule overruns, and software that is unmaintainable and unreliable. The Computer-Aided Prototyping System (CAPS) provides a capability to quickly develop functional prototypes to verify feasibility of system requirements early in the software development process. It was built to help program managers and software engineers rapidly construct software prototypes of proposed software systems. CAPS was developed by the Software Engineering Group at the Naval Postgraduate School (NPS) in Monterey, California.

This thesis investigates the transfer of technology of CAPS from NPS to DoD and the commercial industry. The effective transfer of technology requires user awareness of the technology and the ability to utilize the technology. Thus, a strategy is prepared for implementing the technology transfer of CAPS at NPS. To aid in this implementation, the quality and effectiveness of existing CAPS technical documentation is evaluated and recommendations for enhancement provided. Information dissemination materials are developed as part of this thesis which include three levels of CAPS briefings to potential sponsors, a home page, and a CD-ROM multimedia presentation. The implementation of this strategy will not only maximize the transfer of technology to the users, but also provide the optimum use of DoD software engineering resources available.

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### **OVERHEAD NON-IMAGING INFRA-RED (ONIR) SENSOR-TO-SHOOTER CONNECTIVITY OPTIONS FOR THEATER-WIDE BALLISTIC MISSILE DEFENSE AND PRE-APOGEE INTERCEPT FROM THE SEA**

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**Master of Science in Information Technology Management-March 1996  
and**

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**Master of Science in Information Technology Management-March 1996**

**Advisors: Dan C. Boger, Command, Control, and Communications Academic Group  
Carl R. Jones, Department of Systems Management**

This thesis studies dissemination of Overhead Non-Imaging Infra-Red (ONIR) Defense Support Program (DSP) and National System infra-red (IR) event and track data to tactical users. The study is motivated by a requirement to improve the lethality of Aegis class ships performing in a joint theater-wide ballistic missile defense (TBMD) role. The dissemination of IR data is considered within the context of the entire Theater Event System (TES) architecture and the combat system detect-control-engage TBMD cycle (expanded to sensor-processing-dissemination-weapons systems). Options that will improve the timely receipt of missile warning messages are reviewed. Potential future modifications to the TES architecture are examined in terms of their ability to pass IR missile warning messages to the tactical user within theater-wide missile defense requirements. Options reviewed include (1) early detect reporting, (2) tactical processing improvements, (3) Joint Tactical Ground Station (JTAGS) Remote (JTAGS-R), and (4) JTAGS Navy (JTAGS-N). A Measure of Performance (MOP) Baseline Standard is derived and the options presented are examined and evaluated against this MOP. Finally, based on this information feasibility analysis, a recommendation is made regarding future decisions and requirements for a sea-based theater-wide missile defense information architecture.

### **INTERNETWORKING: NPS ATM LAN**

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**Advisors: Don Brutzman, Undersea Warfare Academic Group  
Rex Buddenberg, Department of Systems Management**

The objective of this research is to create, build, and test an electronic information infrastructure at NPS based on ATM cell relay, and to lay the groundwork for future ATM work at NPS.

One aspect of this research is to critique ATM as a future networking technology for DoD and the U.S. Navy. This research demonstrates five fatal flaws of ATM with respect to the military environment. First, there is the interoperability between switches. There is no way to guarantee communication between switches. Second, there is ATM's incompatibility with IP. There is no native way to multicast with ATM. Overcoming the multicasting problem is probably the greatest ATM problem to solve, and on-going research has yet to find a native ATM solution to this problem. Third, there is ATM's inflexibility to change. Myriad long-haul problems exist. Fourth, there is the human factor. The "expertise" that exists in the ATM field is nominal due to the immaturity of the technology. Fifth, there is the crossover problem. The crossover system from primary to backup mechanisms must be reliable. ATM has not solved the problem of crossover. If a connection is broken, there is no standby connection waiting to immediately take over; and this scenario is exacerbated in the already problematic multicast situation. Before DoD becomes too committed to ATM, these five issues need to be explicitly and fully resolved.

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### DEVELOPMENT OF A FORECASTING MODEL OF NAVAL AVIATOR RETENTION RATES

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The objective of this thesis is to develop an estimating model to predict the effects of various internal and external variables on Naval aviator retention rates. The estimating model will be useful to aviation program managers to develop a spreadsheet tool for predicting retention rates for Naval aviators. Past analyses have focused mainly on analyzing micro-level data. This thesis uses grouped retention rates for all Naval aviators for fiscal years 1977 through 1993 to determine factors associated with the retention decisions made by specific cohorts. The analysis quantifies the relationships between retention and various internal, external and time-related factors. Among the internal factors are various downsizing policies such as the Voluntary Separation Incentive/Selective Separation Bonus (VSI/SSB) program and rightsizing tools such as the Aviation Continuation Pay (ACP) program. External factors examined include both civilian unemployment rates and major airline hiring rates. Additionally, time since minimum service requirement (MSR) was included in the models to control for the effects on aviator continuation rates of the expiration of the MSR during the 6-11 year mark of an aviator's career. Models were specified for each of the naval aviation communities including jet, propeller, and helicopter, and estimated using a grouped LOGIT estimation technique. The study finds that civilian unemployment rates, VSI/SSB, ACP and airline hiring rates have significant effects on retention in the various aviation communities.

### ACQUISITION REFORM: IMPACT OF CONVERSION TO PERFORMANCE AND COMMERCIAL SPECIFICATION/STANDARDS ON THE CHEMICAL STOCKPILE DISPOSAL PROGRAM

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B.S., Lincoln University, 1963

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Advisors: Larry R. Jones, Department of System Management

Sandra M. Desbrow, Department of System Management

The Chemical Stockpile Disposal Program (CSDP) was established to plan and execute the safe destruction of the nation's stockpile of unitary chemical weapons. The CSDP is unique in that it is not a weapon system production program but, a weapon system destruction program with a mandated completion date of end of December 31, 2004. Execution of the program requires that multiple public issues be addressed including the publics concern regarding safety and the environment. Cost growth and EPA permit delays have jeopardized on time completion within life cycle cost estimates. Another relevant issue is reform of the acquisition process, specifically the DoD requirement to convert military-unique specifications and standards to performance statements or commercial equivalents. This research provides evidence that the acquisition reform initiatives on specifications and standards has had a positive influence on program costs with no overall program schedule delays. Continued efforts in this area should enhance the ability to demilitarize the nation's deteriorating stockpile of lethal chemical weapons within projected cost while maintaining or improving the quality and safety levels currently set by the EPA. The specific recommendations provided herein are intended to assist in improving program effectiveness and efficiency.

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### OVERHEAD RATES FOR THE PUBLIC WORKS OFFICE AT THE NAVAL POSTGRADUATE SCHOOL

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Master of Science in Management-December 1995

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This thesis develops unit cost overhead rates for the services provided to the customers of the Public Works Office at the Naval Postgraduate School. All of the costs necessary to operate the Public Works Office were collected and defined as either direct or indirect costs. Cost pools were then established to allow proper allocation of the indirect costs with respect to their individual cost drivers. Overhead rates were then established that would allow the Public Works Office to recover an equitable share of their overhead costs from their reimbursable customers.

### IMPLEMENTATION OF ELECTRONIC FUNDS TRANSFER (EFT)/FINANCIAL ELECTRONIC DATA INTERCHANGE (FEDI) IN THE DEPARTMENT OF DEFENSE: LESSONS LEARNED FROM PRIVATE INDUSTRY

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Advisors: Janice M. Menker, Department of Systems Management

Sandra M. Desbrow, Department of Systems Management

Acquisition reform has taken center stage within the Department of Defense (DoD) contracting system. A major cornerstone of acquisition reform is the use of technology to streamline and facilitate the procurement process. One primary initiative is the application of information technologies such as Electronic Commerce (EC)/Electronic Data Interchange (EDI).

One area where EC/EDI technology is being applied to the DoD electronic payment process through the implementation of EFT/FEDI. This application of information technology to the payment process has provided for a secure, rapid, and cost effective means for issuing payments to DoD contractors. However, the processes involved before and after the electronic payment itself are still causing inaccuracies in contractor payments.

The focus of this research was to provide lessons learned on how private industry has implemented EFT/FEDI to improve the accuracy of contractor payments. The results of this research show that private industry: 1) develops an EC/EDI Strategic Plan, 2) emphasizes senior management consensus and communication, 3) re-engineers the payment process, 4) carefully selects a financial service provider, 5) applies information technology, and 6) communicates with the vendor base.

### DOD PROFIT POLICY ITS EFFECTIVENESS—THE CONTRACTOR'S VIEW

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The Federal Acquisition Regulation requires Government agencies to use a structured approach to determine prenegotiation profit objectives for those contracts requiring cost analysis. The structured approach utilized by the Department of Defense (DoD) is the Weighted Guidelines. This research sought to examine the effectiveness of the current Weighted Guidelines, as a vehicle for implementation of DoD profit policy, from the perspective of the defense industry. Industry opinions were solicited on a wide range of issues through use of a survey instrument. These issues included industry familiarity with the Weighted Guidelines, use of the Weighted Guidelines by industry to prepare for negotiations with the Government, value of profit policy and the Weighted Guidelines as incentives for firms to remain

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in the defense industrial base, and overall opinion of the Weighted Guidelines method. Respondent opinions were analyzed in detail, and conclusions and recommendations for improvement were presented.

### **AVIATION SELECTION TESTING: THE EFFECT OF MINIMUM SCORES ON MINORITIES**

**Brian J. Dean-Captain, United States Marine Corps**

**B.S., University of Notre Dame, 1987**

**Master of Science in Management-March 1996**

**Advisors: Mark J. Eitelberg, Department of Systems Management**

**Anthony P. Ciavarelli, School of Aviation Safety**

The purpose of this study is to examine the effects of Aviation Selection Test Battery (ASTB) cutoff scores on racial/ethnic minority applicants to naval aviation. The data were obtained from the Naval Aerospace and Operational Medical Institute in Pensacola, Florida. The data consist of test scores and performance measures for student pilots from 1988 through 1994, including pilots who were selected by both the 1992 ASTB and the previous version of the selection test. The study simulates the effect of a higher cutoff score on the "Old Test" portion of the data, then relates the findings to what may be occurring under present conditions. The results show that the "selected" pilots performed at a higher level, but the representation of minority groups declined markedly. The "deselected" pilots performed at a lower level and experienced higher attrition. The implication is that the relatively high cutoff score used by the Marine Corps may be improving the overall performance of selected pilots, but it may also be eliminating minority candidates at disproportionate rates. Further study of several options is recommended, including the following: additional selection procedures, intensified recruiting efforts, the use of selective waivers, and adverse impact analysis.

### **INTERNETWORKING: INTEGRATING IP/ATM LAN/WAN SECURITY**

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**Advisors: Don Brutzman, Undersea Warfare Academic Group**

**Rex Buddenberg, Department of Systems Management**

Computer and network security is a complex problem and one that is not solely restricted to classified computer systems and networks. Accelerating trends in networking and the emphasis on open and interoperable networks has left many unclassified systems vulnerable to a wide variety of attacks. Computer and network professionals must understand the scope of security, recognize the need for security for even unclassified systems and then take steps to protect their systems.

Transmission of static passwords in plaintext over the Internet is one of the most widely publicized network vulnerabilities. One-time password mechanisms (such as S-Key) or other secure network access mechanisms (such as Kerberos) have been recommended to improve access security for computer systems connected to the Internet.

This thesis examines many of the issues that must be addressed when assessing the need for computer and network security. This work provides the results of a site security survey for the unclassified IP/ATM LAN in the Systems Technology Lab at the Naval Postgraduate School. These results highlight new security vulnerabilities and strengths that occur when standard Internet Protocol (IP) local-area networks (LANs) are internetworked with Asynchronous Transfer Mode (ATM) wide-area networks (WANs). Finally, we examine the feasibility of the Kerberos authentication protocol for remote plaintext password protection and provide recommendations for additional work.

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### **COST-BENEFIT ANALYSIS OF IMPLEMENTING AN ALUMINUM AND TIN RECYCLING PROGRAM ONBOARD UNITED STATES NAVAL COMBATANTS**

**Edward William Devinney II-Lieutenant, United States Navy**

**B.S., United States Naval Academy**

**Master of Science in Management-December 1995**

**Advisor: William G. Gates, Department of Systems Management**

This thesis analyzes the financial feasibility of implementing a recycling program onboard U.S. Naval Combatants. Numerous laws and international agreements provide the impetus for the Navy to make drastic changes in its solid waste management practices. This study focuses primarily on revenues generated from the sale of aluminum and tin, as they compose the most significant portions of a ship's recyclable waste stream. Specific factors investigated include storage limitations, sanitation concerns, manpower issues, cost constraints, lack of training, lack of incentives, tangible benefits, and perceived benefits. Research was conducted onboard four classes of U.S. Naval Combatants: Arleigh Burke Class Destroyers, Oliver Hazard Perry Class Frigates, Spruance Class Destroyers, and Ticonderoga Class Cruisers. Usage data for both tin and aluminum were gathered from each ship type to determine required storage volumes and potential revenues from the sale of the recyclables. A thorough space inspection was conducted of each ship type to ascertain potential storage spaces and their suitability for temporary storage while underway. Specific findings are that there is adequate storage room aboard these ships, that crews' quality of life will not be sacrificed, and that there exists potential for significant revenues by selling the recyclable cans, all of which are retained by the ship. More generally, it is shown that it is cost-effective to implement an aluminum and tin recycling program onboard U.S. Naval Combatants.

### **MATERIAL ASSIGNMENT AND ALLOCATION DECISIONS FOR FORWARD AND RESERVE WAREHOUSES**

**Edward D. Digges-Lieutenant Commander, United States Navy**

**B.S., United States Naval Academy, 1985**

**Master of Science in Management-June 1996**

**Advisors: Kevin R. Gue, Department of Systems Management**

**Paul J. Fields, Department of Systems Management**

Many Defense Distribution Depots are configured with some warehouses closer to the input/output activity than others. By designating a closure warehouse as the *forward* warehouse and the more distant warehouses as reserve warehouses, overall picking costs can be reduced by assigning the proper mix of material to the forward warehouse.

We show how to determine which material, allocated in what quantities, should be assigned to the forward and reserve warehouses. We use material data collected from Defense Distribution Depot, San Diego and apply four decision strategies to determine the allocation: Assign Similar Material Together, Assign by Popularity, Equal Time Supply, and Economic Assignment Quotient. The results show that material assignment and allocation decisions should consider the picking activity and physical characteristics of each item, as well as the length of time the forward-reserve configuration exists.

### **A CASE STUDY OF MAGNAVOX AS A MODEL FOR PROCESS ORIENTED CONTRACT ADMINISTRATION SERVICES (PROCAS) IMPLEMENTATION**

**Steve Dollase-Lieutenant Commander, Supply Corps, United States Navy**

**B.S., Valparaiso University, 1984**

**Master of Science in Management-December 1995**

**Advisor: Danny Shockley, Department of Systems Management**

This thesis examines the implementation of the Process Oriented Contract Administration Services (PROCAS) program at Magnavox Electronic Systems Company in Fort Wayne, Indiana, one of the seven pilot sites for the program. PROCAS is a Defense Contract Management Command (DCMC) initiative designed to apply the tools of total quality

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management, including cross-functional teaming, continuous process improvement, and empowerment, to the contract administration process. PROCAS supports DCMC's performance based management philosophy, which strives to allocate resources based on assessed contractor risk. The study describes the development, objectives, and components of the PROCAS program. Implementation of PROCAS at Magnavox is analyzed to determine the factors that contributed to the success of the initiative. Barriers to implementation and problems with the implementation are identified and discussed. The benefits of PROCAS for both the Government and Magnavox are analyzed. The study concludes that the implementation was successful, and recommends continuing support of PROCAS by DCMC. Potential areas for expansion of the PROCAS philosophy are identified. The study shows the value of PROCAS in facilitating a total quality transformation of an organization, and in improving the efficiency and effectiveness of Government contract administration.

### **POST DEPLOYMENT SOFTWARE SUPPORT OF THE U.S. ARMY'S SPECIAL OPERATIONS AIRCRAFT: A SOFTWARE ACQUISITION MANAGEMENT CASE STUDY**

**Scott C. Dolloff-Major, United States Army**

**B.S., Bridgewater State College, 1983**

**Master of Science in Management-December 1995**

**Advisor: Martin J. McCaffrey, Department of Systems Management**

This thesis examines the issues faced by the Program Manager in providing for Post Deployment Software Support (PDSS) of the U.S. Army's Special Operations Aircraft, MH-60K and MH-47E. PDSS of Department of Defense weapon systems is becoming increasingly important for several reasons. First, weapon systems functions are migrating from hardware to software. Second, these functions are migrating to software because it is flexible. Third, because software is flexible, it continues to evolve throughout its lifecycle. Finally, this evolution accounts for approximately 70 percent of the lifecycle cost of software. This thesis presents a case study of PDSS of the U.S. Army's Special Operations Aircraft. The case analysis identifies significant management issues in the following areas: acquisition management, project management, and software engineering. Conclusions drawn from the analysis reveal that the success of PDSS is dependent on effective program management. Effective management of a software acquisition involving PDSS requires the following: planning; a cooperative buyer-seller relationship; selection of the proper contract type; technical support resources; and the use of proven software management techniques such as metrics and process maturity assessments. Implementing the recommendations included in this thesis should improve the future management of PDSS.

### **SOCIAL SECURITY: A PRESENT VALUE ANALYSIS OF OLD AGE SURVIVORS INSURANCE (OASI) TAXES AND BENEFITS**

**Shawn P. Duffy-Lieutenant, United States Navy**

**B.S., United States Naval Academy, 1989**

**Master of Science in Management-December 1995**

**Advisor: David R. Henderson, Department of Systems Management**

This thesis presents a present value analysis of the Old-Age Survivors Insurance (OASI) comparing retirement benefits under Social Security with alternative private sector plans and provides a spreadsheet model for making this comparison of plans using different assumptions.

The investigation was done by collecting data from various books, Government publications, and various Government agencies to conduct a spreadsheet analysis of three different wage-earning groups, assuming various real interest rates potentially earned in the private sector. A comparison of Social Security with alternative private sector plans is important to the DoD/DoN because less constrained budgets could result if Social Security is allowed to let individuals opt for private investment.

The analysis presents clear findings showing that most people incur a net present value loss when comparing Social Security to the private sector if realistic real rates of return, on the order of four to seven percent, are used. Individuals

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only experience a net gain when an artificially low rate of return of two percent, which is used by Social Security, is assumed.

### THE IMPACT OF CASE TOOLS, ADA, AND SOFTWARE REUSE ON A DOD SOFTWARE DEVELOPMENT PROJECT

**Loren J. Dugan-Captain, United States Marine Corps**

B.S., University of Idaho, 1989

B.S., Southern Illinois University, 1989

Master of Science in Management-March 1996

**Advisor: Nancy C. Roberts, Department of Systems Management**

Software continues to be the single greatest challenge facing DoD systems developers. The criticality of software as a integral component of system design, continues to grow in importance as DoD moves into the 21<sup>st</sup> Century. To meet this ever increasing challenge, software development organizations are incorporating new design requirements and practices into their development processes. These new requirements/practices, if properly implemented in the development process, can reduce software development and maintenance costs, and increase software quality and development productivity. This thesis investigates the impact of three management-selected software development requirements/software development project, known as Project X. After a brief introduction, the thesis presents background literature on the three development requirements of Project X. The background literature is used to support the Project X case study. Information required for the case study is obtained through interviews with Project X affiliated development personnel. Interview results are analyzed and interpreted through a comparison with information found in the background literature. Results of the case study identify several problems with management's plan to implement the three development requirements into Project X. The thesis identifies specific root causes for the implementation problems, and makes recommendations to reduce the impact of these problems on Project X and other present and future DoD software development projects.

### DECISIONNET: A DATABASE APPROACH

**Steven H. Earley-Lieutenant, United States Navy**

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Master of Science in Information Technology Management-September 1996

**Advisors: Hemant K. Bhargava, Department of Systems Management**

**Suresh Sridhar, Department of Systems Management**

This thesis describes the database design and implementation for DecisionNet — a distributed decision support technology server for the World Wide Web. The main premise of DecisionNet is that decision support technologies can be utilized by consumers as services over the World Wide Web instead of being purchased as stand-alone products. In this sense, DecisionNet performs the role of an "agent," facilitating transactions between consumers and providers.

All of DecisionNet's functions involve some form of data lookup and modification, as well as common fields of data for similar classes of entities. As such, a database approach seems appropriate for DecisionNet. With this approach, the interaction of database queries with scripting languages can facilitate remote execution of decision support software.

The DecisionNet prototype developed as a result of this research involves the use of a relational database that is directly accessed via Common Gateway Interface (CGI) scripts. These CGI scripts are invoked by users with a simple web browser. This thesis contains a description of "agent" models for transactions, the relational database design, a description of all CGI scripts, and development of a user interface for the system.

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### SOFTWARE DEVELOPMENT PROCESS FOR THE AVIATION MISSION

#### PLANNING SYSTEM (AMPS): A CASE STUDY

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Master of Science in Management-December 1995

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The DoD software development environment is one in needed transition. Many of the old methodologies have been less than effective for software development. Emerging methods and techniques, for instance, evolutionary development and incremental delivery, and the use of CASE tools, are supported by a new set of flexible standards. MIL-STD-498, *Software Development and Documentation*, and the coming commercial equivalent, emphasize flexibility, tailoring, and value-added activities. The Aviation Mission Planning Systems (AMPS) software development effort, is a study in the employment of innovative, emerging methods and techniques in this evolving environment. Originally a prototype, the AMPS program will now lead to a production system. The development process for the supporting software is now undergoing a transition. This thesis examines this transition and discusses several process improvement considerations as they relate to the AMPS software development process. Additionally, this thesis explores several areas of concern surrounding the AMPS software development process transition, and suggests possible mitigation approaches.

### THE EFFECT OF MORAL WAIVERS ON FIRST-TERM UNSUITABILITY ATTRITION IN THE MARINE CORPS

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B.B.A., James Madison University, 1982

Master of Science in Management-March 1996

Advisor: Mike Cook, Department of Systems Management

This thesis examines the effects of moral waivers on unsuitability attrition in the Marine Corps. The objectives are to: (1) determine the relationship between moral waivers and first-term, non-EAS unsuitability attrition in the Marine Corps, (2) determine the relationship between demographic characteristics and first-term, non-EAS unsuitability attrition in the Marine Corps, (3) compare the effects of moral waivers among first-term, non-EAS attrition "other than unsuitability" attrition, and "overall" attrition, and (4) compare the relationship between moral waivers and first-term, non-EAS attrition (unsuitability, "other than unsuitability," and "overall") in the Marine Corps with that of the Navy. This thesis uses data from Defense Manpower Data Center for Marine Corps cohorts FY88 thru FY91 and Navy Cohorts FY88 and FY90. Cross-tabulations and binary logic regression models are employed to analyze the effects of moral waivers on unsuitability attrition. The results show that individuals who receive a moral waiver for less than three minor non-traffic offenses, misdemeanors, a felony, preservice drug use, or preservice alcohol abuse are more likely to attrite for unsuitability than individuals who do not receive a moral waiver at accession.

### FIRST-TERM ATTRITION DUE TO PREGNANCY IN THE MARINE CORPS: ISSUES, TRENDS, AND OPTIONS

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B.A., University of Washington, 1990

Master of Science in Management-March 1996

Advisor: Mark J. Eitelberg, Department of Systems Management

The purpose of this thesis is to provide Headquarters Marine Corps with an analysis of pregnancy attrition and an evaluation of related policy options. The study also compares the Marine Corps' experience with that of the civilian population. The research methods include cross-tabulations and multivariate regression analysis. The data were obtained from Defense Manpower Data Center files of enlisted cohorts for fiscal years 1981, 1985, and 1988-1991. The results show that pregnancy rates in the Marine Corps are at levels either equal to or lower than what should be

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expected. In addition, pregnancy attrition rates have been decreasing steadily. It is recommended that the Marine Corps revise its pregnancy education program to address unwanted and unplanned pregnancies, which likely account for the majority of pregnancy attrition cases. Further initiatives are recommended to assist the Marine Corps in achieving its goals of increased female representation and lowered rates of pregnancy attrition.

### **ANALYSIS OF FEMALE ATTRITION FROM MARINE CORPS OFFICER CANDIDATE SCHOOL**

**Cheryl L. Fitzgerald-Captain, United States Marine Corps**

**B.A., Purdue University, 1989**

**Master of Science in Management-March 1996**

**Advisors: Alice Crawford, Department of Systems Management**

**Gail Fann-Thomas, Department of Systems Management**

The purpose of this thesis was to investigate why the female candidates attrition rate from Marine Corps Officer Candidate School is continually higher than the attrition rate of male candidates. Regression analyses were developed to analyze the influence of candidate explanatory variables on success Officer Candidate School using a logistic model. The sample for the logit regression analyses was selected from the Automated Recruit Management System (ARMS) database maintained by Headquarters Marine Corps. The variables examined were not found to be significant with the exception of the candidate's accession source. To further enhance the investigation of female OCS attrition, officer candidate responses to three Officer Candidate School surveys developed by Headquarters Marine Corps were analyzed. Summer 1995 candidates completed pre-course and either post-course or separation (attrition) surveys. Results of the surveys provided insight into the profiles of the candidates who were successful at Officer Candidate School and those who were not. Individual candidates were not tracked from the pre-course to either the post or separation surveys. Further research is needed in this area to draw more specific conclusions and recommendations.

### **ELECTRONIC COMMERCE: AN ANALYSIS OF FINANCIAL TRANSACTION METHODS AND ASSOCIATED SECURITY**

**David Kenneth Flick, Sr.-Lieutenant, United States Navy**

**B.S., United States Naval Academy, 1988**

**Master of Science in Information Technology Management-September 1996**

**and**

**Charles Royce Gillum, Jr.-Lieutenant, United States Navy**

**B.S., United States Naval Academy, 1990**

**Master of Science in Information Technology Management-September 1996**

**Advisors: William J. Haga, Department of Systems Management**

**Barry A. Frew, Department of Systems Management**

This study examines an obstacle to commerce on the Internet and the World Wide Web posed by a popular belief that the Internet and Web lack the technology needed for secure financial transactions. The reality behind such a belief has a direct effect upon commercial and financial transactions by DoD in view of an Executive Order that mandates Internet usage for electronic transactions. This study details and evaluates the methods available for secure financial transactions on the Internet. Each transaction method analysis provides security protocol functionalities, advantages and disadvantages and company profiles. The study also details the impediments to using the World Wide Web as a commercial medium. It concludes that the popular belief is unfounded. Implications are drawn for DoD practices and policy. DoD and the entire U.S. federal government has a stake in the Internet's capability to process secure financial transactions.

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### **CAUSES OF NEGATIVE UNLIQUIDATED OBLIGATIONS IN THE MARINE CORPS' OPERATIONS AND MAINTENANCE APPROPRIATION AND RECOMMENDATIONS FOR THEIR ELIMINATION**

**Daniel F. Foley-Major, United States Marine Corps**

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**Master of Science in Management-December 1995**

**Advisor: James M. Fremgen, Department of Systems Management**

The purpose of this thesis was to identify and analyze the causes of negative unliquidated obligations (NULO) in the O&M, MC appropriation, using sample data drawn from Marine Corps Base, Camp Pendleton, California. NULOs exist when recorded expenditures (liquidations) exceed amounts obligated. As such, NULOs represent out-of-balance conditions that should not have occurred. NULOs were found to be correlated with unmatched disbursements, specific transaction types (USMC Standard Accounting, Budgeting and Reporting System (SABRS) Document Identifier Codes "XSI" and "XRA"), and contracts containing multiple Contract Line Item Numbers. The thesis categorized causes as either fund administrator errors or disbursing errors. Eighty-eight percent of NULOs were attributable to fund administrators' failure to record obligations initially, or only partially, and erroneous adjustments to recorded obligations. SABRS' internal controls were found to be only, partially effective due to their reliance upon data elements that were incorrectly or incompletely input into SABRS and other accounting procedural weaknesses. NULOs remained uncorrected due to a lack of management reports detailing NULOs and fund administrators' failure to use existing management exception reports to identify and correct NULOs.

### **THE EFFECTS OF PRE-SERVICE LEGAL ENCOUNTERS ON FIRST-TERM UNsuitability ATTRITION IN THE U.S. NAVY**

**Anthony W. Frabutt-Lieutenant, United States Navy**

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**M.P.A., Eastern Michigan University, 1988**

**Master of Science in Management-March 1996**

**Advisor: Mark J. Eitelberg, Department of Systems Management**

The purpose of this thesis is to examine whether an individual's arrest record affects his or her likelihood of being discharged for unsuitability during the first term of enlistment in the Navy. This study focuses on California recruits who entered the Navy between 1982 and 1989. California arrest records and Department of Defense cohort data files were combined and examined using cross-tabulations and regression analysis. The merged data permitted the identification of persons who entered the Navy with a disclosed arrest record (and moral waiver) as well as those who enlisted with an arrest record (likely concealed) but no moral waiver. The results suggest that a large portion of unsuitability attrition from the Navy may be attributable to the enlistment of persons who have a pre-service arrest record. The findings also show that many enlistees with a pre-service arrest history failed to receive a moral waiver that matched the offense. It is recommended that steps be taken to access criminal records maintained by the states, in an effort to reduce unsuitability attrition.

### **UTILITY OF A LONG DWELL IMAGING (LDI) CAPABILITY TO ARMY OPERATIONS**

**Patrick F. Frakes-Captain, United States Army**

**B.S., College of William and Mary, 1986**

**M.S., Central Michigan University, 1995**

**Master of Science in Systems Technology (Space Systems Operations)-September 1996**

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**Carl R. Jones, Department of Systems Management**

In response to imagery support shortfalls identified as a result of Operation Desert Storm and imagery related requirements specified in Mission Need Statements, the Central Imagery Office (CIO), the National Reconnaissance Office

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(NRO) and the Defense Airborne Reconnaissance Office (DARO) are currently studying a new capability to add to the United States Imagery System (USIS). This new capability is called Long Dwell Imaging (LDI). The concept involves the ability of a system of sensors to image a given area over an extended period of time. This new capability represents a temporal shift from reconnaissance to surveillance.

The purpose of this study is to: (1) examine the utility of an LDI capability to Army operations as a function of current and future doctrine and the results of field research, and (2) subsequently suggest a baseline architecture which meets the needs of Army warfighters.

This thesis presents a view of the utility of Long Dwell Imaging to Army operations from a doctrinal and operational standpoint. It is intended to serve as a link between the national level intelligence community and the Army warfighter at the corps level and below. Over 15 organizations/commands were visited and more than 30 individuals participated in interviews/discussions. Additionally, the author participated in the CIO sponsored LDI Assessment (LDIA) Expert Panel Session and the LDIA Community Assessment Conference.

### **POTENTIAL FEASIBILITY OF CONTRACTOR SELF-OVERSIGHT IN THE SELF-REPORTING OF DELIVERY DELAYS**

**Carolyn S. Francis-Lieutenant, United States Navy**

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**Master of Science in Management-June 1996**

**Advisor: William R. Gates, Department of Systems Management**

**Kevin R. Gue, Department of Systems Management**

With dwindling personnel resources, there is growing concern over contract management policies within the DoD as well as questions as to how to improve contract management efficiency. Defense Contract Management Command (DCMC) is responsible for performing the majority of contract administration services once a contract has been awarded. Contract delivery surveillance is an extremely important tool in monitoring production of an end item and notifying customers of potential delivery delays. Unfortunately, DCMC personnel available to perform contract delivery surveillance have not increased proportionately to the contract work load. This study examines the feasibility of contractor self-oversight and self-reporting of delivery delays. DCMC's current contract delivery surveillance practices and procedures are presented and analyzed for effectiveness in notifying the customer of delays. Two case studies on contractor delay self-forecasting are also analyzed. This study reveals that there is potential for successful contractor self-oversight and reporting of delays. As more data becomes available, a cost benefit analysis of contractor self-oversight and reporting is recommended.

### **THE EFFECTS OF THE UTILIZATION OF GRADUATE EDUCATION ON PROMOTION AND EXECUTIVE OFFICER/COMMAND SCREENING**

**IN THE SURFACE COMMUNITY: 1986-1994**

**Kim L. Fuchs-Lieutenant, United States Navy**

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**Master of Science in Management-March 1996**

**Advisor: Stephen L. Mehay, Department of Systems Management**

This thesis examines the effect of graduate education on the career progression of Navy surface warfare officers. The probability of promotion to LCDR (O-4), CDR (O-5) and CAPT (O-6) grades as well as the probability of screening for XO and CO are used as career progression milestones. The analysis examines the effect on career outcomes of a graduate education background in general, differences in the effect of holding a Navy-funded graduate degree versus a non-funded degree, and whether the funded degree was in a technical or non-technical curricula. The thesis also investigates the effect of utilization of graduate education on career progression. Finally, the thesis examines the determinants of who decides to pursue (or is chosen to attend) a funded graduate program. The results support the conclusion that officers who select (or are selected for) the graduate education program have stronger undergraduate backgrounds and stronger job performance early in their careers. These traits raise a question of selection bias, since officers who

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have graduate education may have been more likely to promote even if they did not have graduate education. A test for selection bias was developed and incorporated in the career progression models. The results indicate that a fully funded graduate degree has a positive effect on the selected measures of career progression. The probability of promotion to O-6 was higher for officers who utilized their graduate degree as an O-5 compared to those who utilized earlier in their careers. Finally, officers with non-technical graduate majors had a higher probability of promoting than those with technical majors.

### **MODIFIED BENCHMARKING STUDY OF PROGRAM MANAGEMENT WITHIN A MATRIX STRUCTURE**

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**B.S., Savannah State College, 1991**

**Master of Science in Management-March 1996**

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This thesis sought to identify several organizations representing both the government and commercial industry that were successful in implementing program management within a matrix structure to isolate best-practices that lead to superior performance. Research data were gathered from current and former program managers from these organizations. These managers were queried about their experiences with the matrix structure: the matrix implementation process, benefits, pitfalls, and lessons learned. The research findings were significantly parallel to issues identified in existing literature. The analysis revealed that while the matrix structure is highly effective in increasing project integration and customer responsiveness, it is beset by slow decision-making and the effects on organizational culture, such as fear and uncertainty about the future. Comparatively, the advantages of the structure win over the disadvantages. However, while the drawbacks identified by the informants were classified as annoyances as opposed to major hindrances, these managers felt they were challenged to overcome them each day.

### **INFORMATION SYSTEMS SECURITY REQUIREMENTS FOR THE ENGINEERING 2000 INITIATIVE OF THE TOMAHAWK ENGINEERING COMMUNITY**

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**Master of Science in Information Technology Management-March 1996  
and**

**Nina R. Kenmore-Lieutenant, United States Navy**

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**Master of Science in Information Technology Management-March 1996**

**Advisors: Magdi N. Kamel, Department of Systems Management**

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The Tomahawk Engineering community's *Engineering 2000 Initiative*, sponsored by the Cruise Weapons Department at the Port Hueneme Division of the Naval Surface Warfare Center (NSWC-PHD), integrates engineering, logistics and management tools into a single desktop computer. This integration creates problems in providing suitable Information Systems Security (ISS). This thesis addresses ISS and suggests areas that require management attention. The thesis includes a discussion of ISS issues, policies, and initiatives, a development of the ISS Management Model and a methodology for its use; an application of the Model methodology in the assessment of the *Baseline ISS Management State*; and an application of the Model's methodology in the development of the *Target ISS Management State*. The difference between the *Target ISS Management State* and *Baseline ISS Management State* produces a list of ISS recommendations to bridge the gap between the states. Some of these recommendations include: restructuring NSWC-PHD's ISS organization, increasing user awareness, centralizing user accountability to the ISS staff, and increasing management commitment to NSWC-PHD's ISS policies.

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### **DATA MINING USING NEURAL NETWORKS**

**Glenn E. Gearhard-Major, United States Marine Corps**

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**Master of Science in Information Technology Management-September 1996**

**Advisors: Balasubramaniam Ramesh, Department of Systems Management**

**Hemant Bhargava, Department of Systems Management**

The Department of Defense maintains a number of large databases. Recent studies have shown that only a small fraction of such large databases are ever analyzed. These databases present a potential goldmine of valuable information to military planners and commanders. Through the use of powerful Data Mining tools, such as Neural Networks, researchers hope to extract implicit, previously unknown and potentially useful information. This thesis uses an advanced software modeling tool to create a neural network to explore the reasons why career-eligible Marines choose to stay in the Marine Corps. The data set used in this research is from the Headquarters Marine Corps Enlisted Master File from fiscal year 1993. During that period, Marines were offered voluntary separation incentives to help shape the career force during the recent military service downsizing. The network is presented with 37 input variables that include information on a Marine's education, military specialty, and current assignment among other data fields. Many Marines eligible for these separation incentives decided to stay in the Marine Corps. The neural network model results reinforce the importance of physical fitness in the Marine Corps culture and as a career retention factor. Several intangible factors are also highlighted by the network as important factors for Marines to remain in the service. These results may be used by military planners to continue to shape the armed forces manpower pool.

### **THE EVOLUTION OF THE FY1996 DEFENSE BUDGET: AN ANALYSIS OF THE REPUBLICAN REVOLUTION'S IMPACT ON DEFENSE**

**SPENDING AND MILITARY READINESS**

**Kenneth D. Georgi-Captain, United States Marine Corps**

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**Master of Science in Management-June 1996**

**Advisor: Richard B. Doyle, Department of Systems Management**

**Second Reader: Louis Kalmar, Department of Systems Management**

Steadily declining defense budgets and the uncertainty associated with the end of the Cold War have stirred a great debate on the proper budgetary mix of men and material required to achieve military readiness under conditions of fiscal restraint. Many members of Congress and the DoD believe that the structural readiness of today's military has been sacrificed to maintain short term operational readiness. The November 1994 election of the first Republican-controlled Congress in 40 years promised to significantly impact the declining defense budget and address the issue of military readiness. This thesis concludes that while the deficiencies in operational readiness of today's armed forces are not a serious problem, the long term structural readiness of the armed forces is in jeopardy. While the Republicans addressed the long term problem at the margins by increasing the FY1996 investment accounts, a solution which achieves sustainable military readiness requires a reexamination of America's military requirements and the amount of resources it is willing to devote to those requirements.

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### **POTENTIAL APPLICABILITY OF JUST-IN-TIME INVENTORY MANAGEMENT WITHIN THE NAVY**

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**Master of Science in Management-December 1995**

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**Donald Eaton, Department of Systems Management**

There is growing concern over inventory management policies within the Navy as well as questions as to how to improve supply management efficiency. Just-in-time is an inventory management system that has enabled private industries to reduce inventories and waste to become more efficient and profitable. The primary focus of this study is to determine the potential for JIT application within the Navy based on certain criteria necessary for a successful JIT system. Navy organizations are categorized and certain aspects of their resupply functions are analyzed to determine the appropriate inventory management system. A comparison is made between the Navy inventory management system and the elements of a JIT resupply system. An assessment is made to determine eligibility of Navy operations for a JIT inventory management system. Finally, a case study of Naval Aviation Depot North Island, an organization that exhibits potential for JIT, is examined for the specific conditions necessary to permit a JIT resupply system. The study of the NADEP reveals its viable potential for a JIT system within the component repair function. Further research involving review of the current inventory management procedures for the NADEP is recommended.

### **CONGRESS, MILITARY RETIREMENT BENEFITS, AND DEFICIT REDUCTION: A COMPARISON OF MILITARY RETIREMENT ADJUSTMENTS BETWEEN THE 103RD AND 104TH CONGRESSES**

**Steven J. Gottlieb-Major, United States Marine Corps**

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**Master of Science in Management-June 1996**

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**Second Reader: Alice Crawford, Department of Systems Management**

Concern over large annual budget deficits and the contribution entitlement growth has played in this growth, has forced Congress to seek deficit reduction through entitlement reform. This thesis examines congressional policy toward military retirement reform as one part of this process. Through budget reconciliation, Congress enacted military retirement deficit reduction measures in 1993 which delayed retiree COLAs in fiscal 1994-99, but subsequent legislation partially rolled back these delays. Reconciliation instructions in 1995 led to a new deficit reduction initiative affecting military retirement called High-One. Political pressure prevented High-One from becoming law, with mineral sales substituted to achieve the necessary savings. The Balanced Budget Act of 1995, which incorporated the mineral sales, was vetoed. Study of this legislative activity provides important insight into Congress' view of military retirement in deficit sensitive times. It provides a comprehensive record of these events and concludes that future deficit reduction entitlement reform is certain to include military retirement. The form and value of future reform is likely to include further CPI-based COLA reductions. While other structural military retirement reforms are feasible, their contributions must be more critically assessed relative to their impact on force structure objectives.

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### PREDICTING SPACE REQUIREMENTS AT DEFENSE LOGISTICS AGENCY WAREHOUSES

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**Master of Science in Management-September 1996**

**Advisors: David G. Brown, Department of Systems Management**

**Kevin R. Gue, Department of Systems Management**

The Defense Logistics Agency (DLA) currently operates all of the military's Defense Depots, storing millions of cubic feet of material. We compare DLA's storage capacity over the next three years to the demand placed on it by the military—specifically the Service's baseline inventory level plus material returned by deactivated or decommissioned units and ships. We show that DLA will have sufficient storage capacity for fiscal years 1997–1999.

### A SYSTEMS ENGINEERING STUDY OF GLOBAL POSITIONING SYSTEM INSTALLATION ONTO ARMY AIRCRAFT

**Edward D. Grekoski-Captain, United States Army**

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**Master of Science in Management-December 1995**

**Advisor: John Dillard, Department of Systems Management**

The purpose of this thesis is to evaluate the systems engineering effort by the Aviation Research and Development Activity (AVRADA), the Airborne Engineering Research Activity (AERA), and support contractor DOSS to install the Trimble Global Positioning System (GPS) receiver onto Army helicopter platforms. This study is an example of a successful systems engineering effort to install a non-developmental item (NDI) onto existing aircraft platforms in response to an urgent requirement created by the deployment of aircraft for Operation Desert Shield.

### A STUDY OF PROMOTION TO MAJOR IN THE MARINE CORPS

**Mark A. Grillo-Captain, United States Marine Corps**

**B.S., University of Arizona, 1988**

**Master of Science in Management-June 1996**

**Advisors: Stephen L. Mehay, Department of Systems Management**

**Mark J. Eitelberg, Department of Systems Management**

This study identifies factors related to a Marine Corps officer's selection for promotion to major. The focus is on differences in promotion between racial/ethnic groups and between men and women. In addition, data analyses seek to determine the relationship between selected variables—including measures of performance and priority (precept-stated) occupational specialties—and an individual's probability of promotion. The thesis estimates the independent effects of demographic factors, performance, and precepts using multivariate regression models. The estimates are obtained using maximum likelihood techniques. The results of the analysis indicate that personal decorations and performance evaluations are the most important determinants of an individual's probability of promotion, and that being black or female does not statistically affect the promotion outcome.

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### **COST BENEFIT ANALYSIS OF THE NAVAL POSTGRADUATE**

### **SCHOOL AUTOMATED TRAVEL SYSTEM**

**Keri A. Grohs-Lieutenant, United States Navy**

**B.S., Kearney State College, 1985**

**Master of Science in Management-September 1996**

**and**

**Lance R. Theby-Lieutenant, United States Navy**

**B.S., Southern Illinois University, 1988**

**Master of Science in Management-September 1996**

**Advisors: William R. Gates, Department of Systems Management**

**David R. Whipple, Institute for Defense Education and Analysis**

This thesis presents a cost benefit analysis of implementing Travel Manager Plus (TMP) basewide at the Naval Post-graduate School (NPS). Surveying all stakeholders involved in travel administration determined the baseline costs of the current system. the survey identified the steps and time required in pre-travel and post-travel processes. Using the total number of claims processed in FY95, the total cost of travel was determined. Interviews with the personnel currently testing TMP provided the same information for TMP. Combining these data determined the Net Present Value of implementing TMP during the years 1997-2000. Performance metrics and benchmarks were also identified to help NPS track performance and identify areas where improvements could be made.

This thesis research found cost and time savings from implementing TMP. However, the overall net present value is modest due to high outlays for purchasing and maintaining software and administering the system.

### **AN ANALYSIS OF THE MARS CLASS COMBAT STORES SHIP**

### **TRANSFER AND CONVERSION PROGRAM**

**Kelly J. Grosskopf-Lieutenant, United States Navy**

**B.S., Carroll College, 1982**

**Master of Science in Management-December 1995**

**Advisor: Keebom Kang, Department of Systems Management**

In 1990 the Chief of Naval Operations approved the transfer of the MARS class combat logistics force ships to the Military Sealift Command (MSC). Because MSC ships are manned with predominantly civilian crews, the total personnel assigned decreased from approximately 446 to 175 (135 civilian mariners and 40 military), resulting in an annual savings of \$9.8 million per ship transferred. In this thesis we analyze the advantages and disadvantages of the transfer of the ships in terms of personnel and equipment. In addition, we expand upon a previously written computer simulation model that analyzes the effects and results of the newly installed material handling system to include the addition of the ship's flight deck.

### **SURFACE SHIP SHORE INTERMEDIATE MAINTENANCE ACTIVITY COSTS UNDER DEFENSE BUSINESS OPERATIONS FUND REGULATIONS**

**David W. Gunderson-Lieutenant, United States Navy**

**B.S., University of Minnesota, 1988**

**Master of Science in Management-June 1996**

**Advisors: James M. Fremgen, Department of Systems Management**

**Louis Kalmar, Department of Systems Management**

The thesis develops a FY 95 manday rate for a Shore Intermediate Maintenance Activity (SIMA) using Department of Defense Financial Management Regulations (DoD FMR) for Defense Business Operations Fund (DBOF) Operations in support of Regional Maintenance goals. The manday rate calculated, \$694.64, is compared with Naval Shipyard (NSY) composite manday rates for FY 95. The NSY manday rates ranged from a high of \$661.80 to a low of \$408.83 with an average of \$513.35. The comparison is of the costs associated with levels of effort, without adjustments for

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differing productivities or efficiencies. Some deviations from DoD FMR and adjustments to NSY manday rates were required in order to make SIMA and NSY manday rates directly comparable. The thesis also shows that the majority of the costs associated with the operation of a SIMA are fixed; \$76,324,797 of the \$116,288,974 in total operating costs were fixed costs. Of the \$39,964,177 identified as variable costs, \$36,255,321 are unavoidable cost—the costs of materials and services to complete necessary repairs or maintenance which would be incurred by the Navy regardless of where the work was performed. The fixed cost nature of operating a SIMA contributes to the higher manday rate. Computations using hourly labor costs for production efforts resulted in a manday rate of \$572.15 and identified \$14,922,797 as the cost of maintaining a fixed production labor force. Using hourly labor costs for support efforts should provide additional reductions in the manday rate.

### **AN ANALYSIS OF THE ECONOMIC IMPACT OF THE ACCUMULATION OF ASSETS WITHIN THE AVIATION REPAIRABLE TRACKING SYSTEM**

**Parke L. Guthner-Lieutenant Commander, Supply Corps, United States Navy**  
**B.A., University of Northern Colorado, 1981**

**Master of Science in Management-December 1995**

**Advisor: Kenneth Euske, Department of Systems Management**

This thesis sought to research the causes of the accumulation of assets due to unmatched receipts within the aviation Repairable Tracking system, determine the significance of these assets to the system as a whole and make recommendations for recouping the value of the assets and for applying them to the correct appropriation account. The study was conducted from a management control system perspective. In addition to the economic impact, workload impact on all levels, from fleet to staff, were considered before any recommendations were made. The major recommendation is that a system change be made so that all asset turn ins should be coded as credits and thus they will generate replenishment funds to the specific appropriations and budgets.

### **LEATHERNET: AN EVALUATION AS A MISSION PLANNING AND BRIEFING TOOL**

**Tracy R. Hague-Major, United States Marine Corps**  
**B.S., University of Idaho, 1983**

**Master of Science in Information Technology Management-September 1996**

**Advisors: Bill Kemple, Command, Control, and Communications Academic Group**  
**William J. Haga, Department of Systems Management**

The author evaluates LeatherNet, a Distributed Interactive Simulation compliant, virtual simulation system being developed by the Advanced Research Projects Agency to demonstrate Modeling and Simulation (M&S) technologies and to partially fulfill the U.S. Marine Corps M&S goals. The research focuses on evaluation of LeatherNet as a mission planning and briefing tool for Marine infantry company commanders, staff, and subordinate leaders. Evaluation is based on user perception and user performance on a live fire range subsequent to using the system. The user surveys indicate high user acceptance and belief that LeatherNet is a valuable mission planning and briefing tool and that LeatherNet has a good potential to be an effective training tool for commanders and their staffs. User performance, evaluated by subject matter experts on a live fire range, showed no statistically significant improvement for groups exposed to LeatherNet when compared to groups that did not use LeatherNet. The author explains why true differences, even if they do exist, would be difficult to detect due to the lack of experimental control and recommends action to be taken by the Marine Corps to conduct further testing with greater experimental control. The author also suggests steps the Marine Corps can take to optimize its investment in M&S.

## 1996 THESIS ABSTRACTS

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### NAVY DEFINITIONS OF LEADERSHIP AND LMET/NAVLEAD COMPETENCY CLUSTERS COMPARED TO SELECTED LEADERSHIP THEORIES

**Toraiheeb Al Harbi-Lieutenant Commander, Royal Saudi Navy**

**BA, Eastern Washington University, 1982**

**Master of Science in Management-December 1995**

**Advisors: Roger Evered, Department of Systems Management**

**Susan Hocevar, Department of Systems Management**

This study examines the leadership training model used in the U.S. Navy and investigates the way the Navy looks at and defines leadership in general. The emphasis is placed on leadership training for commissioned officers. The objective is dual; first, to make explicit the Navy's concept and definition of leadership, and second, to examine and analyze the leadership training program LMET/NAVLEAD content, as designed by McBer. Then, both the Navy definition of leadership and the LMET/NAVLEAD content are compared to selected popular theories of leadership in order to find out how congruent they are with those theories.

Findings from the study seem to support the conclusion that the core curriculum for officer training in the Navy, as represented by the LMET/NAVLEAD training courses, is not very congruent with the selected leadership theories. In contrast, findings regarding convergence between Navy definitions of leadership and leadership theories shows a strong tie between the definitions and the selected theories.

Based upon the research results, it is recommended that a comprehensive evaluation of the leadership training be conducted to determine the overall effectiveness, in order to make a decision regarding the optimal material mix which should be included in such training that uniformly fits the Navy's present definition, needs and requirements.

Finally, several suggestions for improving the effectiveness of the Navy leadership training are offered.

### LOGISTICS SUPPORT FOR A NONDEVELOPMENTAL ITEM: A CASE STUDY OF THE PORTABLE HYDRAULIC ACCESS RESCUE SYSTEM (PHARS)

**Steven J. Haveraneck-Lieutenant, United States Navy**

**B.S., Michigan State University, 1981**

**Master of Science in Management-March 1996**

**Advisor: Roger Evered, Department of Systems Management**

The purpose of this thesis is to compare the cost effectiveness of alternative methods of providing logistics support for commercially available products purchased by the Government. These products will be referred to under the generic title of nondevelopmental items. The thesis focuses on the acquisition and support strategies for the Portable Hydraulic Access Rescue System (PHARS) as a means of addressing this issue. The effectiveness of alternative methods used to provide logistic support for the PHARS is examined via a cost-benefit analysis. The analysis indicates that nondevelopmental items with system wide applications, low failure rates, high urgency of need, mid-range cost, and well established geographically diverse contractors may best be supported via a mix of contractor and organic support. This analysis may be of value to future program managers in assisting their decision on types and levels of support to be provided to other nondevelopment items.

### RADIANT MERCURY: AN ASSESSMENT OF THE ISSUES

**Lee A. Heaton-Lieutenant, United States Navy**

**B.B.A., Texas A&M University, 1985**

**Master of Science in Information Technology Management-September 1996**

**Advisors: Carl Jones, Department of Systems Management**

**Cynthia Irvine, Department of Computer Science**

The Department of Defense (DoD) has a need to disseminate classified information in a controlled manner. Often classified information must be filtered and/or sanitized prior to its release to particular entities. Sensitive information can be particularly vulnerable to human error in release decisions when a high volume of information is involved.

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Radiant Mercury (RM) is a system designed to alleviate some of the problems associated with such scenarios. By discussing the automated dissemination of classified information with appropriate DoD agencies as well as obtaining briefings from the developers of RM, an analysis of the system was possible. Topics discussed in this thesis include: 1) the adequacy of assurance provided by a Class B1 evaluated system, 2) the intricacy and content/context sensitivity of the RM rules, 3) the near term obsolescence of the RM evaluated hardware platform, 4) the impact of rules modification on system accreditation, and 5) the need for training of RM users. Overall, Radiant Mercury provides an automated system for filtering and disseminating information that may be useful where high message throughput is needed.

### A SOFTWARE RELIABILITY ENGINEERING CASE STUDY

**Judie A. Heineman-Lieutenant Commander, United States Navy**

**B.A., College of the Holy Cross, 1984**

**Master of Science in Information Technology Management-March 1996**

**Advisor: Norman F. Schneidewind, Department of Systems Management**

Handling, identifying, and correcting faults are significant concerns for the software manager because (1) the presence of faults in the operational software can put human life and mission success at risk in a safety critical application and (2) the entire software reliability process is expensive. Designing an effective Software Reliability Engineering (SRE) process is one method to increase reliability and reduce costs. This thesis describes a process that is being implemented at Marine Corps Tactical Systems Support Activity (MCTSSA), using the Schneidewind Reliability Model and the SRE process described in the American Institute of Aeronautics and Astronautics Recommended Practice in Software Reliability. In addition to applying the SRE process to single node systems, its applicability to multi-node LAN-based distributed systems is explored. Each of the SRE steps is discussed, with practical examples provided, as they would apply to a testing facility. Special attention is directed to data collection methodologies and the application of model results. In addition, a handbook and training plan are provided for use by MCTSSA during the transition to the SRE process.

### ANALYSIS AND DESIGN OF AN INFORMATION SYSTEMS

**NETWORK IN THE FORMER SOVIET UNION**

**Matthew S. Herl-Lieutenant, United States Navy**

**B.S., University of Florida, 1990**

**Master of Science in Information Technology Management-March 1996**

**and**

**Gregory A. Rehard-Lieutenant, United States Navy**

**B.S., The Ohio State University, 1987**

**Master of Science in Information Technology Management-March 1996**

**Advisor: Norman F. Schneidewind, Department of Systems Management**

In an effort to facilitate democratic reforms in the Former Soviet Union (FSU), the President of the United States authorized the establishment of American Business Centers (ABCs) through the Freedom Support Act of 1992. The Act promotes U.S. economic interests by establishing commercial partnerships between the United States and the FSU. Integral to this transition is the role of information technology. The purpose of this thesis is to assist the ABCs in defining their information system needs by producing a network model that takes into account the unique operating environment within the FSU. The essential elements of this model are range, reach, and responsiveness. They characterize the utility of an information system to an organization. The model is applied to the ABCs to form a baseline assessment that provides a point of reference from which a target architecture can be formulated. It is this target architecture that is intended to serve as a baseline configuration for local/wide area enterprise networks to be used by the ABCs within the FSU. The thesis concludes with a discussion of those drivers that could significantly affect the viability of the American Business Centers.

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### CAUSALITY TRACING USER INTERFACE DESIGN AND DEVELOPMENT FOR A SOFTWARE MANAGEMENT FLIGHT SIMULATOR

Luis Hernández-Major, United States Army

B.S., University of Puerto Rico, 1983

Master of Science in Information Technology Management-December 1995

Advisor: Tarek Abdel-Hamid, Department of Systems Management

Interactive simulations are a highly suitable tool for training managers in their increasingly complex roles in software project management. This research effort designs and implements an interactive user-friendly interface for the system dynamics software development and project management model using a flight simulator as a metaphor. Methods and techniques for good user interface development are considered and implemented using the Ventana Simulation (Vensim) application development, modeling, and analysis environment. The resulting interface facilitates the user experimentation with management policy strategies and decision making, as well as the investigation of scenarios to determine what the circumstances were that caused the project's expected behavior to vary. The analysis capabilities of the interface enables the user to trace cause and effect relationships that are often invisible and not considered when making management decisions. The interface's causal tracing functionality significantly enhances the value of the underlying model as a learning tool by facilitating the development of an integrated, improved vision of the world that managers are responsible to control.

### IMPROVING THE COST EFFECTIVENESS OF HAZARDOUS MATERIAL MANAGEMENT PROGRAMS ABOARD U.S. NAVY DOCK LANDING SHIPS (LSD'S)

Matthew Charles Hellman-Lieutenant, Supply Corps, United States Navy

B.S., United States Naval Academy, 1986

Master of Science in Management-June 1996

Advisor: William R. Gates, Department of Systems Management

Louis G. Kalmar, Department of Systems Management

This thesis analyzes the cost effectiveness of alternatives to the U.S. Navy's current hazardous materials management practices onboard its ships. Numerous recent laws regarding pollution prevention aboard ships as well as significant reductions in Department of Defense spending has led the Navy to seek initiatives to manage hazardous materials in a more efficient and cost effective manner. This thesis deals with reducing wastestream volume and costs and improving the management of the Hazardous Minimization Centers (HMC's). Research was conducted onboard seven U.S. Navy Dock Landing Ships (LSD's): *USS Anchorage*, *USS Comstock*, *USS Fort Fisher*, *USS Fort McHenry*, *USS Harper's Ferry*, *USS Mount Vernon* and *USS Rushmore*. Hazardous material wastestream data was gathered for each ship to determine the significant material contributors to disposal costs. Additionally, information was accumulated concerning the training received by HMC operators to identify potential management weaknesses. Research identified significant cost savings by replacing the currently used baled wiping rags with shop towels provided by a contracted commercial vendor. Also noted was the fact that HMC operators were not receiving the requisite training required to properly manage HMC's. Therefore, training alternatives are addressed to ensure competent management of HMC's.

### THE WARFIGHTERS' FUTURE LINK TO INFORMATION

Christopher B. Henderson-Lieutenant, United States Navy

B.S., Mathematics, Auburn University 1988

Master of Science in Systems Technology (Command, Control, and Communications Systems)-June 1996

Advisors: Dan C. Boger, Command, Control, and Communications Academic Group

Rex A. Buddenberg, Department of Systems Management

The purpose of this thesis is to introduce the concept of having a jointly integrated networking schema to better enhance battlefield communications and the dissemination of information using a smart push/pull concept from the highest commander down to the individual soldier. The concept of having a robust and dynamic network could provide

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the United States Armed Forces a better way of integrating the individual soldier's performance into higher level units. Current systems in the armed forces inventory are not truly interoperable, and not everyone has the capability to receive the information that these systems carry. A networked battlefield would allow everyone on the network to receive data carried by all systems.

With smart integration and design using commercially tested standards, the network can be built for all battlefield components. Each component would bring its equipment into the battlefield and become part of the network. Their systems would be able to plug and play with all other systems in the battlefield. The liberal use of COTS and GOTS networking equipment will reduce the cost of the network and would ensure compatibility among the battlefield components. Using OSI layers in the design of the system would ensure compatibility. DoD would need to make a concerted effort by having all of the services agree to make the battlefield network a top priority.

### **THE ROLE OF THE PROJECT MANAGER DURING THE FOREIGN MILITARY SALES OF NEW TACTICAL WHEELED VEHICLES**

**Linda R. Herbert-Captain, United States Army**

**B.A., Hamline University, 1985**

**M.S., Central Michigan University, 1992**

**Master of Science in Management-December 1995**

**Advisor: Thomas H. Hoivik, Department of Systems Management**

This thesis examines the functional management role of the Project Manager with respect to the Foreign Military Sales process associated with the sale of new tactical wheeled vehicles. An effective FMS implementation process is becoming more crucial to the encouragement and sustainment of United States defense companies, and for the modernization of allied forces. A comparative analysis of the sale of the new Family of Medium Tactical Vehicles to Thailand and Kuwait, was conducted to identify the role of the Project Manager and develop lessons learned and recommendations for issue resolution. Both cases were analyzed from five different perspectives: 1) comparative analysis of the PMO's actions in the Letter of Offer and Acceptance phases, 2) functional analysis of the security assistance agencies involved in the FMS vehicle process, 3) functional management role analysis of the PM, 4) ethical considerations concerning FMS and the PM, and 5) an analysis of the impact of FMS on the industrial base. Conclusions drawn from these analyses reveal that the functional management role of the PM is vital to the successful completion of FMS transactions. Adoption of the recommendations in this thesis should result in improved project management and project effectiveness in future Foreign Military Sales agreements.

### **CONSOLIDATION OF FIELD CONTRACTING ACTIVITIES IN DOD**

**Perry J. Hicks-Civilian, United States Army**

**B.S., Southern Oregon State College, 1968**

**Master of Science in Management-December 1995**

**Advisor: Sandra M. Desbrow, Department of Systems Management**

This research reviews the current opportunity, due to the changes resulting from the Federal Acquisition Streamlining Act (FASA), for the DoD to consolidate field contracting by region rather than by each Service at the installation level. The intent of this research is to look at past consolidations and the successes attained as a result of the consolidation. In addition, recent consolidations in areas other than contracting were analyzed for the savings yielded DoD. Questionnaires were sent to field contracting offices of all Services to determine the affect of FASA. The results of these surveys showed that there will be a significant change in the number of large contracts procured as a result of FASA, and there will be minimal impact on the simplified purchase threshold. Recommendations include: (1) Contracting offices should be consolidated into area DoD offices in order to maximize the efficiency of contracting at the field contracting level, (2) consolidation should be accomplished in coordination with the fielding of the Standard Procurement System over the next five years by DoD, and (3) simplified purchases should be left at the installation level with direct supervision by the district office.

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### AN EXAMINATION OF ACQUISITION ETHICAL DILEMMAS: CASE STUDIES FOR ETHICS TRAINING

**Joycelin R. Higgs-Lieutenant, Supply Corps, United States Navy**  
**B.S., United States Naval Academy, 1987**

**Master of Science in Management-December 1995**

**Advisor: Susan P. Hocevar, Department of Systems Management**

As a skill, ethical decision making requires cultivation through training and practice. However, for Department of Defense acquisition employees, ethical training has been more of an orientation to legal requirements and restrictions, than as a guidance for learning how to make ethical decisions. Although legal parameters of acceptable behavior and theoretical discussion of ethics are necessary to provide a foundation for a well-developed system of ethics, they do not provide practical approaches to ethical dilemmas.

From narratives collected in interviews, this study identifies common ethical dilemmas faced by Department of Defense acquisition employees and analyzes the decision processes used to resolve the dilemmas. The narratives have been compiled into acquisition ethical case studies, which can be used to supplement and tailor current Department of Defense ethics training.

### IMPACT ON WORKLOAD AT THE NAVAL POSTGRADUATE SCHOOL DUE TO THE IMPLEMENTATION OF CREDIT CARDS

**Theodore A. Hleba-Lieutenant Commander, United States Navy**  
**B.S., Robert Morris College, 1981**

**Master of Science in Management-December 1995**

**Advisor: Shu S. Liao, Department of Systems Management**

The purpose of this thesis is to determine the impact on workload redistribution resulting from the use of government credit cards at the Naval Postgraduate School (NPS). Because workload requirements, particularly the Supply Department's, may have been redistributed across other departments at NPS, these will be identified and measured. Primary data on procurement cases was collected from the Comptroller's Department and the procurement branch of the Supply Department. Pre-credit card procedures (purchase orders, BPAs and the Imprest Fund) and related purchase action volume were identified and measured, as well as government credit card procurement procedures and related purchase action volume. The intent is to identify any workload requirements, such as technical screening, procurement and material receipt, which may have been redistributed as a result of using government credit cards.

### TAIWAN, ROC REGIONAL OPERATIONS CENTER IN ASIAN-PACIFIC

**Pao-jui Ho-Commander, Republic of China Navy**

**B.S., Chinese Naval Academy, 1979**

**Master of Science in Management-June 1996**

**and**

**Ching-yuan Ma-Captain, Republic of China Air Force**

**B.S., Chung-Cheng Institute of Technology, 1990**

**Master of Science in Management-June 1996**

**Advisors: William Gates, Department of Systems Management**

**Michael D. Cook, Department of Systems Management**

The purpose of this study is to examine the Taiwan, ROC policy for establishing Taiwan as a Regional Operations Center in Asian-Pacific market. The study addresses five questions; the definition of a regional operations center, services the center will provide, reasons for the government policy, significance of the policy, and the expected results of the policy. The study addresses the subject from a microeconomics, macroeconomics and international trade perspective. Finally, the authors present their conclusions and recommendations.

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### AN ECONOMIC MODEL FOR SEABORNE OIL TRADE

**Kain-Wah, Hong-Major, Republic of Singapore Navy**

**B.Eng., University of London, 1988**

**Master of Science in Operations Research-March 1996**

**Advisor: Dan Boger, Department of Systems Management**

This thesis aims to provide some insights as to how oil prices and oil flows might vary with the carrying capacity of the tanker fleet as affected by political events. It provides an econometric analysis of tanker freight rates in the modern era and proposes a mathematical (quadratic) programming economic model that links the crude oil market to the supply elasticity of the world oil tanker fleet based on a competitive economy. The economic model can be considered as a version of the Walras-Cassel general-equilibrium system which possesses an economically meaningful equilibrium solution in terms of oil prices, freight rates and the pattern of oil distribution. The implementation of the model is completed using the General Algebraic Modeling System (GAMS). The study concludes with a scenario study showing how the model could be used to examine the importance of South East Asia's sealanes in world seaborne oil trade. The model shows the economic vulnerability of oil importing nations, especially Japan, the United States, and Western Europe, to a possible closure of South East Asian sealanes.

### SURVIVOR BENEFIT PLAN: AN ANALYSIS OF DIRECT REMITTANCES DIVERTED TO THE U.S. TREASURY

**Andrew W. Hovanec-Major, United States Marine Corps**

**B.S., University of Arizona, 1982**

**Master of Science in Management-December 1995**

**Advisor: Shu S. Liao, Department of Systems Management**

The Survivor Benefit Plan is a voluntary program designed to provide income protection for dependent survivors of members of the armed forces who die in retirement or while on active duty after reaching retirement eligibility. Obligations of the Federal government, arising under the Survivor Benefit Plan, to survivors are paid from the Military Retirement Fund. United States Code Title 10, § 1452 requires persons participating in the Plan, and not entitled to retired pay, must deposit in the U.S. Treasury vice the Military Retirement Fund the premium payments that would otherwise have been deducted from their retired pay for that period. The member is required to pay premiums due to the Plan through a process called direct remittance. This thesis determined the annual amount of direct remittances arising from the Survivor Benefit Plan, and analyzed the financial loss to the Military Retirement Fund due to the diversion of these funds to the U.S. Treasury. An understanding of this process and the unique problems that direct remittances from the Survivor Benefit Plan represent provides a valuable contribution to understanding the accounting and valuation process of the Military Retirement Fund.

### EVOLUTIONARY DESIGN OF LOCAL AREA NETWORKS

**Ta Hsing-Major, Republic of China Marine Corps**

**Chinese Naval Academy, 1982**

**Master of Science in Information Technology Management-September 1996**

**Advisors: Suresh Sridhar, Department of Systems Management**

**Rex Buddenberg, Department of Systems Management**

This study presents the evolutionary design of a local area network. In the last few years network managers have been faced with rapidly advancing technology and increased demand on LAN bandwidth from users. The purpose of this study is to assist network managers in decision making when developing a mid-size LAN.

The methodology for this study is to develop a mid-size LAN using current technology to replace a router-based design with a switch-centric design. As an example, the current proposal for the Republic of China's military school's campus network is used as a basis for redesigning a LAN by taking advantage of the emerging switch technology. This switch-centric design is evolved from a revised basic model to an enhanced and advanced model.

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The resultant design arrived at is less expensive, easier to manage, and simpler than the current router-based design and allows greater flexibility to meet users' increasing bandwidth demands. The fundamental advantages of switching technology over router-based solutions is a lower per port cost, higher capacity and faster response.

### **AN APPROACH TO USING TOTAL LIFE CYCLE COST AND TOTAL QUALITY MANAGEMENT IN PROJECT MANAGEMENT IN THE INDONESIAN NAVY**

**Indarto Iskandar-Commander, Indonesian Navy**

**B.S., Indonesian Naval Academy, 1971**

**B.S., in Economics, Indonesian Open University, 1992**

**Master of Science in Management-September 1996**

**Advisors: Paul J. Fields, Department of Systems Management**

**Francis B. Fassnacht, Department of Mechanical Engineering**

Project management is very important to many industrial and governmental organizations. For governmental organizations, projects are vehicles for growth and improvement. In the Indonesian Navy for example, project management is needed to develop new warships, such as destroyers or submarines. The goal of project management is to ensure a high quality result.

Generally speaking, quality is defined as adherence to specifications and high quality is defined as exceeding those specifications. Not meeting the specifications is unacceptable quality. For a project like building a warship, the Total Life Cycle Cost can be considered primarily as a function of four things: design, construction, operation and maintenance. The selection of the design and the contractor are one time decisions and cannot be changed over the life of the ship. In contrast, operation and maintenance are on-going management decisions, yet they are largely determined by the design selected and the quality of the contractor's work.

To have the lowest Total Life Cycle Cost, the right design and the right contractor must be selected. This thesis develops a Design Review Checklist and a Contractor Review Checklist that can be used in reviewing the contractor's design and the contractor's quality management capabilities.

### **INTEGRATED LOGISTICS SUPPORT IN SPECIAL OPERATION AVIATION—**

#### **A CASE STUDY OF THE MH-60K AND MH-47E**

**Scott Alan Jacobsen-Captain, United States Army**

**B.S., Marquette University, 1985**

**Master of Science in Management-June 1996**

**Advisors: John Dillard, Department of Systems Management**

**Orin Marvel, Command, Control, and Communications Academic Group**

This thesis identifies the major factors faced by the Program Manager in developing and implementing the integrated logistics support plan (ILSP) for the U.S. Army's Special Operations Aircraft (SOA), the MH-60K and MH-47E. The SOA Program had many unique characteristics which made it a prime candidate for identification of major factors and development of lessons learned. Two of those unique characteristics are the facts that it was designated a nondevelopmental item (NDI) acquisition, and the fact that it is an extremely low density weapon system. Effective integrated logistics support (ILS) planning poses a challenge in "normal" developmental programs. Ensuring that ILS is handled effectively in low density NDI acquisitions can be a significantly more difficult challenge for the acquisition professional. This thesis develops a case study of ILS in the unique environment of the SOA Program. It also analyzes four maintenance specific ILS elements in an attempt to identify major factors that significantly impacted the development and implementation of the SOA ILSP. From these major factors, numerous lessons learned are developed. Some of the more important lessons learned are that: Sustainment of low density weapon systems is far more complicated and expensive through separate small Program Management Offices than it is through existing Program Management Offices; The density of the weapon system being procured is one of the most important factors to consider when making key ILS decisions; and Logistics Support Analysis tailoring and use are critical to establishing and implementing successful ILS in weapon systems. Study of the major factors and lessons learned presented in this thesis should

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improve the future development and implementation of ILSPs in Special Operations Aviation programs and NDI programs as a whole.

### **USING GENETIC ALGORITHMS TO SEARCH LARGE, UNSTRUCTURED**

### **DATABASES: THE SEARCH FOR DESERT STORM SYNDROME**

**David L. Jacobson-Lieutenant, Medical Service Corps, United States Navy**

**B.S., United States Naval Academy, 1986**

**Master of Science in Information Technology Management-September 1996**

**Advisor: Hemant K. Bhargava, Department of Systems Management**

**Second Reader: Donald Gaver, Department of Operations Research**

The Exploratory data analysis problems have recently grown in importance due to the large magnitudes of data being collected by everything from satellites to supermarket scanners. This so-called "data glut" often precludes the effective processing of information for decision-making. These problems can be seen as search problems over massive unstructured spaces. A prototypical problem of this type involves the search, by Department of Defense medical agencies, for a so-called "Desert Storm Syndrome" which involves large amounts of medical data obtained over several years following the Persian Gulf conflict. This data ranges over more than 170 attributes, making the search problem over the attribute space a hard one. We propose the use of genetic algorithms for the attribute search problem, and intertwine it with search algorithms at the detailed data level. Computational results so far strongly suggest that our system has succeeded at the given tasks, requiring relatively few resources. They also have found no indication that a single syndrome or other medical entity is responsible for wide-spread adverse health ramifications among a significant cross-section of Persian Gulf War participants in the CCEP program. There are, however, numerous correlations of exposure/demographic information and associated symptoms/ diagnoses which suggest that smaller groups may share common health conditions based on shared exposure to common health risk factors.

### **THINKING STRATEGICALLY ABOUT INFORMATION-BASED CONFLICT: DEVELOPING AN ANALYTICAL APPROACH TO OPERATIONAL MEASURES OF EFFECTIVENESS**

**Shawn D. James-Lieutenant, United States Navy**

**B.S., United States Naval Academy, 1989**

**Master of Science in Information Technology Management-September 1996**

**Advisor: Carl R. Jones, Department of Systems Management**

John Arquilla, Information Warfare Academic GroupMilitary measures of effectiveness (MOEs) are fundamental in determining the relative contribution of a weapon system or course of action to a campaign's objectives. This thesis examines the development of Information-Based Conflict (IBC) measures of effectiveness (MOEs) at the operational level of war—an area that has received little attention. First, IBC is explored in terms of the strategic implications this new warfare area holds for future warfighting, including an investigation of whether IBC represents a military innovation or revolution, possible end-states to which IBC could contribute, and an evolution of IBC strategic thought. Then, the problems inherent to MOEs are illustrated with historical examples and some qualitative metrics are outlined across each level of war. Next, three specific IBC programs are examined in-depth for their approach to MOEs. Against this backdrop, an analytical approach is proposed for further IBC MOE development. Using Kiviat diagrams, this approach allows IBC MOEs to be visually represented so that the multi-dimensional, subjective, quantitative and qualitative characteristics of IBC are accommodated. In the end, this analytical approach promises to provide a new tool by which to assess the operational effectiveness of IBC.

## 1996 THESIS ABSTRACTS

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### **MULTIYEAR CONTRACTING FOR NON-MAJOR WEAPONS SYSTEMS**

**Cary D. Johnson-Lieutenant, United States Navy**

**B.B.A., University of Texas at Arlington, 1985**

**Master of Science in Management-March 1996**

**Advisor: Rebecca J. Ramsay, Department of Systems Management**

The focus of this thesis is to determine the use of multiyear contracting for purchasing non-major weapons systems. The intent of this research is to analyze long-term procurement of supplies and equipment, specifically valves, pumps and compressors. The purpose of the study is to determine the level at which multiyear contracting procedures are used to acquire supplies and equipment. The study will determine factors which promote or restrict the utilization of multiyear contracts. Surveys and interviews were used to assess the use of long-term procedures for buying supplies. The conclusion indicates that multiyear contracting is limited when purchasing repair parts for weapon systems, and there are alternative methods used to procure repair parts on a long-term basis. Recommendations include making policy and procedural changes to promote the increased usage of multiyear contracts, and implementing programs to market the benefits of long-term contracting, especially multiyear contracting.

### **DESIGN AND IMPLEMENTATION OF CADET CORPS (CADCORPS): A MULTIMEDIA DBMS APPLICATION FOR PERSONNEL AND TRAINING**

**Sharon Elizabeth Johnson-Lieutenant, United States Navy**

**B.S., University of Florida, 1986**

**Master of Science in Information Technology Management-December 1995**

**Advisor: Daniel Dolk, Department of Systems Management**

This thesis develops a prototype Multimedia Relational Database Management System application entitled CADCORPS. CADCORPS will be used by the Monterey County Division of the Naval Sea Cadet Corps and the Navy League Cadet Corps. A rapid prototyping approach in concert with a four phase development process is used to develop the prototype. The first chapter of the thesis provides introductory information on the purpose, scope, and methodology of the thesis. Chapter two addresses the definition and requirements phases. The design phase is addressed in chapter three. Chapter four discusses the implementation phase in conjunction with hardware, software, system programming, testing, security, and maintenance. Chapter five gives the fundamentals of incorporating Multimedia data such as sound and graphics into the prototype. The conclusion gives the advantages of using CADCORPS and provides recommendations for future improvements to the prototype.

### **ANALYSIS AND DESIGN OF A SPECTROMETRIC INTERFACE SYSTEM FOR THE JOINT OIL ANALYSIS PROGRAM TECHNICAL SUPPORT CENTER, PENSACOLA, FLORIDA**

**Shirl D. Johnson-Lieutenant, United States Navy**

**B.S., University of South Carolina, 1987**

**Master of Science in Information Technology Management-September 1996**

**Advisors: Suresh Sridhar, Department of Systems Management**

**Janice Menker, Department of Systems Management**

This thesis addresses the analysis and design of a prototype relational database management system for oil analysis entitled, JOAP Spectrometric Interface System. A rapid prototype approach was used in concert with the four phases of the system development life cycle. The database application will be used to conduct spectrometric analysis and physical property testing on used oil samples from selected equipment. The information will be stored in a centralized database for historical purposes to determine if there is a problem with the manufacture of parts and engines, and look for potential problems that could affect the safety and performance of equipment. The spectrometric interface application will greatly assist the Joint Oil Analysis Program (JOAP) increase effectiveness, readiness, and economy of equipment.

## 1996 THESIS ABSTRACTS

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### **U.S. MARINE CORPS STRATEGIC CAMPAIGN PLAN FOR IMPLEMENTATION OF ELECTRONIC COMMERCE/ELECTRONIC DATA INTERCHANGE (EC/EDI)**

**Frank E. Johnston-Captain, United States Marine Corps**

**B.S., United States Naval Academy, 1990**

**Master of Science in Management-June 1996**

**Advisors: Mark W. Stone, Department of Systems Management**

**William J. Haga, Department of Systems Management**

The focus of this research is to examine the Electronic Commerce/Electronic Data Interchange (EC/EDI) implementation plans within the Marine Corps and its various procurement offices. The primary intent is to evaluate the plan and determine if the Marine Corps can meet the Presidential Mandate that agencies adopt (EC/EDI by 1997. This research analyzes, compares, and contrasts the plan to commercial EC/EDI implementation practices. Additionally, this thesis identifies the obstacles and virtues of the Corps' EC/EDI implementation plan. Finally, recommendations and improvements to the Marine Corps EC/EDI implementation plan, if needed, are offered.

### **EXECUTIVE MANAGEMENT EDUCATION TRACKING SYSTEM (EMETRAK) DESIGN AND IMPLEMENTATION ISSUES**

**Steven M. Jones-Major, United States Marine Corps**

**B.A., Jacksonville University, 1979**

**M.B.A., Webster University, 1994**

**Master of Science in Information Technology Management-June 1996**

**Advisors: Suresh Sridhar, Department of Systems Management**

**Steven R. Lamar, Institute for Defense Education and Analysis**

The Executive Management Education Program is the Department of the Navy's competency-based educational program for senior health care executives. It is designed to prepare Navy Medical Department officers for the challenges of managing modern military health care programs. This research effort analyzes the requirements of an information system to support the Executive Management Education Program. The systems development life cycle is used as a project management tool to guide system development. A requirements study is conducted to determine the information needs of the various customers. Process, data, and network models are used to describe system requirements. A prototype single-user system is implemented using Microsoft Access 2.0 and an architecture for a multi-user client server database application is proposed.

### **CASE ANALYSIS OF THE U.S. ARMY WARFIGHTING RAPID ACQUISITION PROGRAM: BRADLEY STINGER FIGHTING VEHICLE—ENHANCED WEAPONS SYSTEM**

**Walter Jones-Captain, United States Army**

**B.S., University of California, Riverside 1986**

**Master of Science in Management-June 1996**

**Advisors: Orin E. Marvel, Command, Control, and Communications Academic Group**

**Michael Boudreau, Department of Systems Management**

The Army's Warfighting Rapid Acquisition Program (WRAP) transitions compelling U.S. Army Training and Doctrine Command Battle Lab experimentation successes into rapid acquisition successes. However, WRAP is not a "one-size-fits-all" material development solution to acquisition streamlining; it is best suited for programs relying on the integration of mature technologies which pose low technical risk, such as NDI.

This thesis analyzes the Bradley Stinger Fighting Vehicle-Enhanced (BSFV-E) air defense system to determine the impact of WRAP upon accelerated acquisition in this system's development. From this analysis of the BSFV-E program as a single point of data, lessons learned are identified which might be used by other acquisition managers to effectively manage future programs which emerge as Battle Lab experimentation successes and are approved for rapid acquisition through the WRAP process.

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One lesson learned is that BSFV-E's streamlined acquisition process permitted a significant reduction in the administrative and procedural requirements which typically burden systems development. In addition, this case study identified that lack of funding for WRAP-approved programs like the BSFV-E can potentially transform a rapid acquisition program into a business-as-usual program. This study concludes that the BSFV-E is one example of an excellent acquisition streamlining role model.

### **PERFORMANCE MEASURES FOR MILITARY SEALIFT COMMAND'S SPECIAL MISSION OCEANOGRAPHIC SHIPS**

**John D. Jung-Lieutenant Commander, United States Navy**

**B.S., Mankato State University, 1984**

**Master of Science in Management-June 1996**

**Advisors: William R. Gates, Department of Systems Management**

**David G. Brown, Department of Systems Management**

This thesis suggests measures of performance MSC could use to monitor ongoing improvements in the Special Mission Oceanographic Ship program. A literature review was conducted to establish the importance of measures and propose a process for their development. Interviews with NAVOCEANO and COMNAVMETOCOM personnel determined customer needs and their expectations concerning service quality. Using this input, a list of performance measures was synthesized. Interviews of MSCLANT and MSCPAC personnel determined the measures currently tracked. The developed measures were compared to the measures currently tracked. The developed measures were compared to the measures currently tracked to reveal holes or overlap. Finally, specific customer issues with service were addressed. Research found that MSC does not currently measure performance in these areas. Proposed measures were highlighted that would track performance improvement in these areas.

This thesis research found that there are some elements of performance important to the customer which are not being tracked by MSC. Secondly, it is important to involve MSC personnel, their customers and suppliers, etc. in identifying and developing measures for improvement monitoring. Finally, measures identify problems and quantify the improvement made in performance. A measurement system alone won't correct problems.

### **MISSION ESSENTIAL SERVICE: EVALUATION AND ENRICHMENT OF AFLOAT MWR INITIATIVES**

**David A. Kennett-Lieutenant, United States Navy**

**B.A., Marietta (Ohio) College, 1983**

**Master of Science in Management-June 1996**

**Advisors: Alice M. Crawford, Department of Systems Management**

**Benjamin J. Roberts, Institute for Defense Education and Analysis**

This thesis evaluates the effectiveness of medium-sized surface combatants with respect to managed MWR programming and positive organizational outcomes that relate to mission readiness. These social and professional outcomes include morale, cohesion, job satisfaction, organizational commitment, work stress reduction, wellness, good order and discipline, and productivity. Substantial evidence exists that well-managed afloat MWR and comparable private sector programs have a significant impact on these organizational outcomes, particularly cohesion and wellness. A field survey of 255 enlisted and officer personnel, and structured interviews of senior shipboard leaders, were conducted onboard six Cruiser and Destroyer-Class ships home ported in San Diego, California to assess the progress of afloat MWR in creating mission support outcomes. The study explored the association of MWR satisfaction levels for home port, underway, and visiting port programs to perceived outcome levels, and found the strongest evidence of these relationships through the interviews. There is also support for the relationship between leadership commitment and positive outcomes. However, large gaps still exist between the enlisted and officer communities in regard to MWR satisfaction levels and outcomes. These challenges can be met through committed and innovative top leaders, collaborative relationships at middle management levels, and the use of MWR to sustain cohesion throughout the ship's rank structure.

## 1996 THESIS ABSTRACTS

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### REENGINEERING A COMPUTER-BASED TRAINER FOR A HELICOPTER NIGHT VISION SYSTEM

**Dabney R. Kern-Lieutenant, United States Navy**

**B.S., Jacksonville University, 1989**

**Master of Science in Information Technology Management-September 1996**  
and

**Kenan J. Shaffer-Lieutenant Commander, United States Navy**  
**B.E.E., Villanova University, 1984**

**Master of Science in Information Technology Management-September 1996**  
**Advisors: Anthony Ciavarelli, School of Aviation Safety**  
**Kishore Sengupta, Department of Systems Management**

While there have been unfavorable responses to Department of Defense "right-sizing" efforts, this force restructuring has actually produced certain positive results. Capitalizing on technological advances, the aviation community, in particular, has adapted to personnel cuts and reduced budgets without sacrificing the quality of training. As a result, considerable emphasis is currently placed on computer-based training (CBT) applications. The development of this type of training for critical, high-risk, missions, such as those involving scarce night vision equipment, has encouraged numerous research projects including this thesis.

Sponsored by Naval Air Systems Command (PMA-205), this thesis discusses methods used to re-engineer the UH-1N helicopter Aviator's Night Vision Imaging System/Heads-Up Display (ANVIS/HUD) CBT for use in the HM-60H community. By using portions of code, graphics, and text originally designed for the UH-IN CBT, the HH-60H version was developed through a revision process which incorporated new material as required.

The final product is a trainer consisting of five instructional modules, combining student evaluation and remediation features through interactive lessons and exercises. In accordance with current design principles, an object-oriented authoring system enabled the production of a quality CBT that meets the sponsor's budget and time constraints, and promises to be a key training asset for HH-60H personnel.

### AN EVALUATION OF THE HUMAN RESOURCE DEVELOPMENT PROCESS SUPPORTING CASS

**George F. Kilian-Lieutenant Commander, United States Navy**

**B.A., Eastern Washington State College, 1973**

**Master of Science in Management-December 1995**

**Advisor: Paul J. Fields, Department of Systems Management**

This thesis is an evaluation of the human resource development process supporting the Consolidate Automated Support System (CASS). The CASS Implementation Plan and related Navy Training Plan are established to deliver CASS hardware/software and a trained workforce to the fleet for system operation and maintenance throughout its life cycle. This study involves an overview of both plans, a definition of basic personnel development and requirements for any weapons system, a review of historical ATE training deficiencies, and the current status of CASS technician training at the Naval Aviation Maintenance Training Group Detachments (NAMTRAGRUDETs). Its conclusions are that the plans collectively address the elements essential to develop a skilled workforce to support CASS throughout its life cycle. However, delivery delays of CASS Station hardware, Test Program Sets (TPSs), and a representative sample of various aircraft Weapons Repairable Assemblies (WRAs) and Shop Replaceable Assemblies (SRAs) pose problems that must be resolved before training can satisfy the majority of acquisition, fleet maintenance, and training management desires.

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### AN ANALYSIS OF CONTAINERIZATION OF AMMUNITION EFFORTS IN THE REPUBLIC OF KOREA AND THE UNITED STATES

Chong K. Kim-Lieutenant, United States Navy

B.A., University of Rochester, 1988

Master of Science in Management-March 1996

Advisor: Keebom Kang, Department of Systems Management

This thesis examines current and future efforts to modernize ammunition handling capability in the Republic of Korea and the United States. It describes how these improvement programs will enhance the current capability of Chinhae, Korea and Concord, California, the proposed containerized ammunition handling ports of the two countries, to ensure success of Major Regional Conflict-West (MRC-W) scenario as outlined in the Mobility Requirements Study (MRS) 1992. Also, various containerized ammunition related issues such as the lessons learned from TURBO Containerized Ammunition Distribution System (CADS) Exercise 1994 and Desert Storm/Desert Shield are discussed.

### INTRANETS

James Charles King-Major, United States Marine Corps

B.S., University of Arizona, 1985

Master of Science in Information Technology Management-September 1996  
and

William Paul Mizerak-Major, United States Marine Corps

B.S., and B.A., Binghamton University, 1983

Master of Science in Information Technology Management-September 1996  
Advisors: James C. Emery, Department of Systems Management

Suresh Sridhar, Department of Systems Management

The purpose of this thesis is to develop a prototype Client-Server application that can be used by selected Naval Postgraduate School staff-members to coordinate meeting agendas and travel plans. A prototype application that can be implemented and deployed on an organizational network was designed and developed using commercially available tools. The thesis also addresses the current computing problems confronting this institution and the reasons why corporate America is embracing Web-based intranet technology; it will also examine why a Web-based intranet is a viable solution for many of the computing problems facing this organization. Additionally, we examined other applications that can be developed and deployed on an intranet at the Naval Postgraduate School. Finally, we explore the renowned intranet at Sandia National laboratories and explain which factors played the most significant role in the success they have achieved with intranet technology at their organization.

### USING AUTOMATIC IDENTIFICATION TECHNOLOGIES FOR LOGISTICS SUPPORT ON BATTLEFIELDS OF THE FUTURE

James D. Kinkade-Captain, United States Army

B.S., University of Southern California, 1986

Master of Science in Management-March 1996

Advisor: Dan C. Boger, Department of Systems Management

This thesis analyzes potential uses of automatic identification technologies to support Army forces on future battlefields. The thesis emphasizes radio frequency (RF) tag systems, but also presents an overview and comparison of six other automatic identification technologies (bar codes, optical character recognition, magnetic stripe, smart cards, optical cards, and voice recognition). The dynamics shaping the Army of the future, the characteristics of that Army, and the characteristics of the logistics system that will support it are discussed. Given those characteristics, potential logistic uses of automatic identification technologies (AIT) are considered. Recent Army applications are presented and the results and lessons learned evaluated. The thesis concludes that AIT can play a central role in future Army logistics, in particular, if effectively coupled with existing Army systems, AIT can provide commanders and logisti-

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cians with invaluable knowledge about the location and status of essential materiel and its expected arrival time at the desired location. In the information age, this level of knowledge may make the difference between success or failure on the battlefield.

### **INTERSERVICE RIVALRY. MISSION CONSOLIDATION AND ISSUES OF READINESS IN THE DOD: A CASE STUDY OF U.S. NAVY EA-6B JOINT-SERVICE EXPEDITIONARY SQUADRONS**

**Christopher C. Kirkham-Lieutenant, United States Navy**

**B.A., Villanova University, 1989**

**Master of Science in Management-September 1996**

**Advisors: Lawrence R. Jones, Department of Systems Management**

**Barbara E. Pawlowski, Department of Systems Management**

This thesis provides an in-depth analysis of interservice rivalry and the roles and missions debate, the trend towards jointness and mission consolidation within the Department of Defense, and their effects on issues of logistics, funding and readiness. A case study of recently established EA-6B *Prowler* Joint-Service Expeditionary Squadrons organized to replace the Air Force EF-111A *Raven* highlights the implications of mission competition and consolidation in the post-Cold War era and serves as the focal point for analysis in the areas of logistics, funding and readiness. This study begins with a review of interservice rivalry, jointness and mission consolidation providing both historical and current examples. The case study of the Joint-Service Expeditionary Squadrons covers initial planning and organization through recent developments and progress toward Navy assumption of the electronic warfare mission for the Department of Defense. Finally, an analysis of logistics, funding and readiness based on the case study is presented. The thesis concludes with a summary of findings, proposed areas for continued research and concluding remarks.

### **A PROPOSED ARCHITECTURE FOR ON-LINE JDISS TRAINING**

**William P. Kopper-Lieutenant, United States Navy**

**B.A., Northwestern University, 1987**

**Master of Science in Information Technology Management-September 1996**

**Advisors: Suresh Sridhar, Department of Systems Management**

**Tung Bui, Department of Systems Management**

The Joint Deployable Intelligence Support System (JDISS) is the primary Department of Defense system for the exchange of intelligence information. Unfortunately, the system lacks an adequate computer learning application. The widespread implementation of universally connected client/server networks, such as JDISS, will soon be enhanced by advanced World Wide Web (the Web) services. The combination of the Web and object-oriented technology, known as distributed object technology, may provide a solution to this problem. Use of the Common Object Request Brokerage Architecture (CORBA) Object Request Broker (ORB) could allow users of the (JDISS) to create customized training modules on-line the distributed object environment. Until JDISS adopts an ORB standard, an intermediary on-line training system based on advanced HTML, Java applets, and JavaScript could provide some of the functionality expected of an ORB based system. Regardless of the technology used to develop on-line JDISS training, certain system requirements must be met by any system to ensure its success. These requirements are defined from both the user and system administrator perspectives.

## 1996 THESIS ABSTRACTS

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### AN ANALYSIS OF NAVAL OFFICERS SERVING ON JOINT DUTY:

#### THE IMPACT OF THE 1986 GOLDWATER-NICHOLS ACT

John Peter Kovach-Lieutenant Commander, United States Navy

Master of Science in Management-March 1996

Advisor: Stephen L. Mehay, Department of Systems Management

The purpose of this thesis is to examine trends in the quality of officers assigned to joint duty and analyze the effect of joint assignments on an officer's career. This study examines officers appearing before the 1988-1994 Commander and Captain promotion boards. Results of cross tabulations indicate qualitative differences between officers receiving the JS2 before and after 1 October 1989. Officers receiving the JS2 after 1 October 1989 demonstrated significantly higher performance (as measured by fitness report data) than officers receiving a JS2 prior to 1 October 1989. Officers receiving the JS5 were of higher quality than average, regardless of the date of the AQD. This study also examines the effects of joint duty on an officer's likelihood of promotion, and compares the results across four warfare communities: SWO, SUB, PILOT, and NFO. The results indicate that SWOs and NFOs receiving a JS2 designator prior to 1989 have a lower probability of promotion to Commander. Conversely, SWOs receiving a JS2 designator after 1 October 1989 have a significantly higher probability of promotion to Commander is positive for SWOs appearing before the 1990-94 promotion boards and NFOs appearing before the 1988-90 promotion boards. The effect of a JS5 on promotion to Captain is positive for SWOs appearing before the 1988-90 promotion boards, and for Pilots appearing before all Captain promotion boards.

### TRAINING DEVELOPMENT FOR NEW MATERIEL ITEMS

#### IN ARMY ACQUISITION PROGRAMS

Brent Kremer-Captain, United States Army

B.S., University of Oregon, 1986

Master of Science in Management-June, 1996

Advisors: John T. Dillard, Department of Systems Management

Orin E. Marvel, Command, Control, and Communications Academic Group

This thesis was undertaken to analyze and document the Army's training development process as it relates to the materiel development of corresponding Army acquisition programs. Training development is a vital necessity for the successful fielding of any new materiel item. The acquisition process in general should not only focus on materiel development management, but on training development management as well. The performance of any weapon system will always be a measure of both how well the equipment is made and how well it is operated.

The study examines current Army doctrine and regulations, and it solicits input from various training development agencies to analyze the training development environment in this era of military reductions. The author's hypothesis was that the Army training development community is being reduced faster than materiel development programs. Interviews with training development personnel, and the results of a survey generated for this thesis support that hypothesis.

Given that training development reductions are outpacing materiel program elimination, the thesis provides two recommendations to reduce the negative impact on training development. One involves use of an automated document suspense management system to increase the efficiency of reduced staffs in training development agencies, the other outlines a potential methodology for procuring contractor provided training development.

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### USING EXPERT SYSTEMS TO CONDUCT VULNERABILITY ASSESSMENTS

Debra A. Lankhorst-Lieutenant, United States Navy

B.S., University of North Carolina at Greensboro, 1984

Master of Science in Information Technology Management-September 1996

Advisors: Carl Jones, Department of Systems Management

Vicente C. Garcia, Department of Electrical and Computer Engineering

An Information Warrior faces a complex and dynamic operating environment. To conduct an accurate Vulnerability Assessment and Risk Analysis of the enemy force (or a friendly force), a multitude of cause and effect relationships must be examined. Many times the person at the battle scene conducting the assessment may lack experience and/or knowledge, precluding a time-sensitive and effective assessment. The author proposes a framework for a global network of expert systems and decision support systems to conduct the Vulnerability Assessments and maintain Information Warfare readiness through realistic training. The author also presents a Vulnerability Assessment and Risk Analysis heuristic with the objective of expanding the knowledge base and decision speed at the on-scene commander level. In achieving and implementing this global network, numerous benefits can be realized, including increased speed and efficiency in the receipt of intelligence information, thereby allowing for improved decision-making capabilities. Since the technology and know-how are already available, this vision of the global network is attainable and can be successfully implemented and operated.

### PROCURING CONTRACTING OFFICER'S GUIDE TO COST/SCHEDULE CONTROL SYSTEMS CRITERIA (C/SCSC)

Tae H. Lee-Lieutenant Commander, United States Navy

B.S., Brigham Young University, 1985

Master of Science in Management-June 1996

Advisors: Danny A. Shockley, Department of Systems Management

James M. Fremgen, Department of Systems Management

This research examined the procuring contracting officer's (PCO) role in implementing and administering Cost/Schedule Control Systems Criteria (C/SCSC) within the Department of Defense. The purpose of this study was to develop a practical guide to C/SCSC for the PCO to use as a ready reference while on the job or in a training environment. As such, some germane topics addressed in this thesis include objective of C/SCSC, C/SCSC related items of DoD solicitations, evaluation of the contractor's C/SCSC plan or program during source selection, C/SCSC validation and compliance reviews, application of cost and schedule performance data, and current initiatives for improvement of CSCSC. The underlying goals of this thesis was to make the PCO aware of the importance of reliable cost and schedule performance data to the success of a major acquisition program, and the vital role that (s)he plays in assuring that the contractor's integrated management system generates it.

### MK 92 MOD 2 FIRE CONTROL SYSTEM MAINTENANCE ADVISOR EXPERT SYSTEM: IMPLEMENTATION AND DEPLOYMENT

Thomas James Leonard-Lieutenant Commander, Supply Corps, United States Navy

B.S., University of North Carolina-Chapel Hill, 1981

Master of Science in Information Technology Management-September 1996

Advisors: Martin J. McCaffrey, Department of Systems Management

Magdi N. Kamel, Department of Systems Management

This thesis perpetuates research aimed at deploying a diagnostic expert system for the MK 92 Mod 2 Fire Control System to 28 Oliver Hazard Perry class fast frigates. Referred to as the Maintenance Advisor Expert System (MAES), this expert system is being jointly developed by the Naval Postgraduate School and Port Hueneme Division, Naval Surface Warfare Center (NSWC PHD).

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This thesis focuses on the long-term implementation issues related to deploying MAES to the fleet, integrating MAES into the formal training pipeline, and transitioning life cycle support for MAES to NSWC PHD. MAES long-term implementation issues, which include hardware, software, documentation, and training requirements, are examined within the context of implementation factors and risks historically associated with deploying expert systems.

Plans for deploying MAES to the fleet and integrating MAES into the formal training pipeline are provided. As part of the documentation necessary to transition life cycle support of MAES to NSWC, a System Level Description document is also provided.

### **EXPERT SYSTEMS DEVELOPMENT UTILIZING HEURISTIC METHODS**

**John N. Lewis-Lieutenant, United States Navy Reserve**

**B.A., California State University, Sacramento, 1984**

**Master of Science in Information Technology Management-June 1995**

**Advisors: Hemant Bhargava, Department of Systems Management**

**Donald Eaton, Department of Systems Management**

This thesis analyzes the diagnostic domain and isolates the heuristics employed by experts to arrive at diagnostic solutions. These heuristic methods are then generalized in order to arrive at a series of heuristic rules that can be applied to a wide range of diagnostic processes independent of their respective domain. To test the validity of the generalized heuristics, a prototype expert system was created targeting the heuristics employed by avionics repair technicians in repair of the APS-115 radar system on the P-3C Orion.

### **USING CLIENT-SERVER APPROACH TO DESIGN A GENERIC LOCAL AREA NETWORK**

**(LAN) FOR NAVAL ACADEMY OF REPUBLIC OF CHINA (ROCNA)**

**Hsiu-Shan Li-Lieutenant Commander, Republic of China Navy**

**B.S., Chinese Naval Academy, 1982**

**Master of Science in Information Technology Management-March 1996**

**Advisor: Norman F. Schneidewind, Department of Systems Management**

This thesis demonstrates the application of design theory as it relates to the generic LAN for the Naval Academy of the Republic of China (ROCNA). The first part of the study covers a theory dealing with system analysis and design, network technology and data communication. This is used for a foundation for the development of a end-user survey and feasibility study for the ROCNA LAN. Chapter III of this study is a background of the ROCNA and an analysis of the Naval Academy's network requirements. In Chapter IV a generic LAN is developed to meet the ROCNA's requirements and different alternative designs are investigated. A cost-benefit analysis is performed to select between the design alternatives.

The design selected uses a point-to-point connection dual ring backbone and a 10BaseT star topology for subnetworks. Finally, recommendations and conclusions are presented in Chapter V for more emphasis on information technology education in the Republic of China's Armed Forces and specifically at the ROCNA.

### **A COMPARISON OF EQUITABLE PER DIEM POLICIES FOR UNITS DEPLOYED TO U.S. BASES**

**Daniel B. Limberg-Lieutenant, United States Navy**

**B.B.A., University of San Diego, 1988**

**Master of Science in Management-December 1995**

**Advisors: Katchan Terasawa, Department of Systems Management**

**Jerry McCaffery, Department of Systems Management**

This thesis addresses the per diem funding requirements for units deployed to U.S. bases. Three alternative programs are compared: (1) the current Lodgings Plus policy, (2) AIRPAC's Smart TAD test, and (3) the DoD Task Force to Reengineer Travel recommendation to provide rations in kind. The impacts of these three alternatives on the Type

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Commanders, travelers, messing facilities, and MWR activities are examined to ensure that the missions can be accomplished while maintaining a high quality of life for the travelers. The primary areas evaluated are galley operations, missed meal reimbursement, and MWR compensation.

Findings include that savings can be achieved by adopting the Rations In Kind policy, while still maintaining a high quality of life for the travelers. With the reduction in the DoN budget, some action is required to bridge the predicted shortfall between available funding and the budget needed to fully support the travel requirements. This study recommends that AIRPAC's Smart TAD test be modified and expanded to ensure that travel funds are available to support future operational commitments and readiness.

### **PHYSICIAN PAYMENT REFORM AND THE IMPLEMENTATION OF THE MEDICARE FEE SCHEDULE: AN INSTITUTIONAL AND RESOURCE DEPENDENCY PERSPECTIVE**

**Michael Lipski-Lieutenant Commander, United States Navy**

**B.S.E.E., University of Mississippi, 1984**

**Master of Science in Management-December 1995**

**Advisors: Richard B. Doyle, Department Systems Management**

**Kenneth J. Euske, Department Systems Management**

The purpose of this thesis was to gain an understanding of the formation and implementation of the objectives of the Medicare Fee Schedule as set forth in the Omnibus Budget Reconciliation Acts of 1989 and 1990.

The research for this thesis was approached by employing the methodology suggested by the institutional and resource dependency theories of organizational behavior. Archival research was the primary technique used to obtain data describing behavioral and fiscal trends associated with Medicare Part B and the Medicare Fee Schedule. Analytic and empirical research techniques were also applied to facilitate identification of organizations active in the reform environment. Research finds were used to construct the model of the Department of Health and Human Services organizational environment on which the analysis was based.

Findings include: a) a fragmented pre-reform organization environment, b) general consensus regarding the concept of physician payment reform among the Department of Health and Human Services and organizations active in the environment, c) disagreement and coalition building in the organizational environment in response to the Department of Health and Human Services proposed rule, and d) effective pressure group politics by special interest group in gaining the congressional support needed to convince the reform administrator to engage in major payment reform rule revisions.

### **NAVY'S LESS-THAN-TRUCKLOAD COST FACTORS**

**Frank M. Long-Lieutenant Commander, United States Navy**

**B.A., Portland State University, 1979**

**Master of Science in Management-June 1996**

**Advisors: Dan C. Boger, Department of Systems Management**

**David G. Brown, Department of Systems Management**

Historically the Navy's less-than-truckload transportation costs have been higher than DLA and the other Armed Services according to Military Transportation Management Command's (MTMC) Financial Information System (FINS) data. A sample of the FINS database was analyzed attempting to isolate factors causing the Navy's higher costs.

Working with the FINS data to determine how the summarized data was prepared, numerous questions concerning input, procedures, and data manipulation led to questions of data validity. During the sample period, more than 50% of the Navy's LTL shipments were carried by QUICKTRANS, and not considered by the FINS data. Navy users of FINS data should be aware of its limitations.

The FINS data indicated the Navy's higher LTL costs may be attributed to a higher percentage of ammunition and explosive shipments than the other services. Additionally, it was found that the Navy utilized the guaranteed traffic program far less than DLA. Factors including weight, distance, and rates were also explored.

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### **ENSURING A C2 LEVEL OF TRUST AND INTEROPERABILITY IN A NETWORKED WINDOWS NT ENVIRONMENT**

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**B.S., Ohio State University, 1988**

**Master of Science in Information Technology Management-September 1996**

**Advisors: Gus Lott, Department of Electrical and Computer Engineering**

**Cynthia E. Irvine, Department of Computer Science**

**Rex Buddenberg, Department of Systems Management**

With the progression of computer systems to local and wide area networks, the scope of computer security has increased dramatically over the past two decades. Now, more than ever, the use of "trusted systems" is needed to ensure the secrecy, integrity, and availability of computer resources. However, attaining the levels of trust required has been difficult for a variety of reasons. This paper provides an in-depth look at the government's Trusted Computer System Evaluation Criteria (TCSEC) and its current applicability. An analysis of a military network running Windows NT version 3.51 as the network operating system is provided as a case study. The paper concludes with a discussion of the advantages and disadvantages of the TCSEC criterion. Although products have been certified as meeting the various class requirements, existing problems are preventing the attainment of "trusted" system from becoming a reality for many government organizations.

### **AN ALTERNATIVE TESTING METHODOLOGY FOR TOW MISSILE TRAINING SYSTEMS**

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**B.S., United States Naval Academy, 1985**

**Master of Science in Operations Research-September 1996**

**Advisor: Dan C. Boger, Department of Systems Management**

**Second Reader: Paul S. Bloch, Department of Operations Research**

This thesis explores alternatives to current testing methodology being applied to two TOW missile training systems. This thesis contends that current program practices do not adequately prove system accuracy or system training value. Research emphasis is placed upon identifying those factors involved in assessing system accuracy that are currently being overlooked. The objective is that future government testing will address system accuracy and training value in detail. Following a description of current techniques, an alternative to current accuracy assessment is presented using the precepts of direct fire gunnery based upon a series of statistical treatments that quantify system accuracy and contract specification compliance. Data collection enhancements, potential test design modifications, and a methodical data analysis plan is presented. An alternative testing scenario is developed based upon the recommended changes in test methodology. Finally, observations and recommendations are provided pertaining to program management of the two TOW missile training systems in an effort to optimize program structure. The underlying premise is that the application of operations research skills to validate system performance will improve the final product fielded to U.S. Marines and Soldiers.

### **SURVEY OF USER AUTHENTICATION MECHANISMS**

**Marianna B. Magno-Lieutenant, United States Navy**

**B.S., California State Polytechnic University, Pomona, 1983**

**MBA, Mississippi State University, 1987**

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The use of a password as the only traditional user authentication mechanism has been criticized for its weakness in computer security. One problem is for the user to select short, easy to remember passwords. Another problem is the selection of a password that is too long which the user tends to forget. Long passwords tend to be written down

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carelessly somewhere in the work space. Such practices can create serious security loopholes.

Consequently, this is a survey of alternative password mechanisms and other improved devices that are now available in the marketplace to enhance computer security. It taxonomizes the existing inventory of user authentication mechanisms such as biometrics, challenge/response, password, smart card and token.

### DECISION SUPPORT FOR NETWORK CONNECTIVITY PLANNING

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Master of Science in Information Technology Management-September 1996

Advisors: Suresh Sridhar, Department of Systems Management

Hement K. Bhargava, Department of Systems Management

The aim of this thesis is to design and implement a highly-graphical, computer based decision support system (DSS) to assist in the design of "optimum" network connectivity plans. The *Web Spinner* DSS is a "proof-of-concept" system which highlights how the marriage of basic decision methodologies with a modern computing environment can be used to create a robust decision support tool.

The basic concepts of decision support systems and their practical value to today's information worker are discussed. The challenge in designing the best network plan is presented along with several examples illustrating the complexities and scale of the problem. The *Web Spinner* DSS is presented as a potential solution to at least part of the network design problem. The capabilities and design principles of the *Web Spinner* are provided along with a tutorial and a sample problem. Finally, some suggestions for improving the *Web Spinner* DSS are reviewed. It is shown that some of these improvements can greatly enhance the value of the *Web Spinner* in supporting decisions related to network connectivity.

### METHODS FOR DETERMINING GOALS AND EXPECTATIONS FOR FIELDDED JET ENGINES

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Master of Science in Management-December 1995

Advisor: W. Max Woods, Department of Operations Research

Second Reader: Donald R. Eaton, Department of Systems Management

This thesis investigates methods for determining goals and expectations for fielded jet engines. Some of these methods employ concepts used in Reliability Centered Maintenance (RCM). The procedures developed here can be applied to any fielded jet engine. The data used by this thesis was extracted from the Naval Aviation Logistics Data Analysis (NALDA) database. The desktop software programs that were used to attain reliability parameters are readily available to any command. The data analysis accomplished here demonstrated that cannibalization of engines has impacted adversely on reliability. A model was developed to determine no-build times for jet engines at the Intermediate Maintenance and Depot level of repair based on engine reliability and the conditional probabilities of survival of significant components of the engine and their specified maximum operating times

### CORPS SAM: DOWN SELECTION TO ONE CONTRACTOR VS. COMPETITION

Thomas R. Marino, Jr.-Captain, United States Army

M.S., Graduate School of Public Health, University of Pittsburgh, 1985

Master of Science in Management-December 1995

Advisor: Keith F. Snider, Department of Systems Management

The purpose of this thesis is to research the history of the Corps SAM program, focusing on the issue of whether to maintain competition or to down select to a single contractor. An analysis is conducted to examine the down selection and whether the program risks of cost overrun, failure to meet schedule, and poor weapon performance can be averted

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without the use of continuous competition. This thesis concludes that down selection to one contractor provides more benefit to the program than maintaining competition throughout the acquisition process for the Corps SAM program.

### **DESIGN AND IMPLEMENTATION OF A PROTOTYPE DATABASE SYSTEM FOR THE OPERATIONAL ACTIVITY SCHEDULE OF THE HELLENIC NAVY**

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**Master of Science in Information Technology Management-March 1996**  
**Advisor: James C. Emery, Department of Systems Management**

The Hellenic Navy General Staff has a difficult mission which encompasses several tactical, operational, and administrative tasks. The most important operational task for the General Staff is to prepare the Operational Activity Schedule for every ship, subcommand, and command in the Hellenic Navy. In order to more effectively prepare this schedule, an automated database system is required. This system would contain all operational activity records for the Hellenic Navy units and other pertinent information. Furthermore, the system would produce ad hoc reports, as well as a variety of other reports designed by the user to support ship maintenance schedule.

This thesis designs and implements an automated database system that can be used from the Hellenic Navy General Staff. The methodology followed is the standard systems' development life cycle (SDLC). The requirements for the system are obtained, and the database and application are designed and implemented. Paradox 5.0 for Windows is used for the database management system software. Special issues like training, security, conversion, and maintenance are taken into consideration.

The result of this thesis is a functional application named "OADS" (Operational Activity Database System) that will fulfill users' requirements, keep track of the operational activities of the Hellenic Navy units, and help in performing the desired tasks accurately.

### **DESIGN AND IMPLEMENTATION OF A NATOPS QUALIFICATION DATABASE MANAGEMENT SYSTEM FOR NAVAL AVIATION SAFETY OFFICERS**

**Terryll R. Martin-Lieutenant Commander, United States Navy**

**B.S., University of Arizona, 1980**  
**M.S., Naval Postgraduate School, 1990**

**Master of Science in Management-June 1996**  
**Advisor: Hemant K. Bhargava, Department of Systems Management**  
**Second Reader: Douglas E. Brinkley, Department of Systems Management**

The VFA-125 Safety Office located at NAS Lemoore is burdened with the enormous administrative responsibility of managing the NATOPS qualifications for over 200 pilots and passengers. During this period of military downsizing and operational funding cuts, this responsibility will require the increased attention of a smaller staff with a limited budget. The burden of paper file management could be eased through the introduction of automated record keeping while simultaneously increasing accuracy and efficiency. The potential for non-qualified personnel to fly squadron aircraft could be eliminated.

Based on VFA-125 Safety Office requirements, this thesis designs and implements a database management system. The primary objective is to automate the currently utilized manual NATOPS filing system to allow the squadron Safety Officer immediate access to all NATOPS-related pilot qualification data. This system will store, sort and compare data relevant to all squadron pilots while minimizing the time spent verifying the previously-used manual filing system. Additionally, the staff will be able to query reports and generate memoranda with minimal effort. The system is also analyzed to determine possible enhancements in the future. The Aviation Safety Database System is designed using dBASE III Plus and dBASE for Windows 5.0.

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### **DETAILING OF MILITARY SEALIFT COMMAND CIVIL SERVICE MARINERS AND IMPLICATIONS FOR THE AFLOAT PERSONNEL MANAGEMENT CENTER**

**Colleen A. Matthews-Lieutenant, United States Navy**

**B.A., Oberlin College, 1982**

**Master of Science in Management-March 1996**

**Advisor: Dan C. Boger, Department of Systems Management**

This thesis is a management study which describes and analyzes the processes implemented by the Military Sealift Command's Atlantic and Pacific Area Commands in the detailing of civil service marine personnel to Naval Fleet Auxiliary Force (NFAF) and selected Special Mission ships. Detailing is a complex process in which a personnel specialist assigns a mariner to a given ship while at the same time ensuring that he has completed the requisite training and possesses the appropriate United States Coast Guard license or documents. Because of the enormous impact it has on mariners' working lives, this thesis also examines mariners' perceptions of the detailing service they presently receive.

The pending consolidation of personnel operations now performed at each Area Command under an Afloat Personnel Management (APM) Center will have a significant impact on the detailing function and on the quality of customer service received by civilian mariners. This study considers the impact of the APM Center on the detailing process and the level of customer service delivered. Conclusions and recommendations are presented.

### **THE FAIRNESS OF CHANGE IN THE MILITARY RETIREMENT SYSTEM**

**David S. Mazenko-Captain, United States Marine Corps**

**B.A., University of Arizona, 1987**

**Master of Science in Management-December 1995**

**Advisors: Alice Crawford, Department of Systems Management**

**Mark J. Eitelberg, Department of Systems Management**

This thesis addresses the issue of fairness as it relates to military retired pay. Taxpayers, as well as retirees, are seen as central to the discussion of fairness. Determination of fairness is accomplished by examining the purposes of retired pay. Further evidence of the system's fairness (or unfairness) is provided by comparisons with other plans. A final perspective on fairness is obtained by analyzing how military life has changed since the current system was instituted. Each perspective suggests that military retired pay is overly generous. This thesis rejects the view that retired pay is compensation for the sacrifices endured during a military career, and concludes that the benefits provided by the current system could be reduced and still remain fair to retirees.

### **A NEW APPROACH TO COUNTERESPIONAGE WITHIN THE DEPARTMENT OF DEFENSE: TRACKING ILLICIT GAINS LAUNDERED THROUGH OFFSHORE FINANCIAL CENTERS**

**Christie L. McCarthy-Lieutenant, United States Navy**

**B.S., University of Illinois, 1990**

**Master of Science in Management-March 1996**

**Advisor: Joseph San Miguel, Department of Systems Management**

This thesis explored the emerging relationship between espionage and money laundering, and sought new methods of using offshore financial activity and data to identify and prosecute spies. Research data were gathered through an intensive literature review and personal interviews conducted with financial enforcement and counterespionage experts from nine government agencies. The research demonstrated that the focus of espionage activity centers increasingly on lucrative technological secrets, necessitating the laundering of illicit gains to disguise their origin. Because of complex and varied schemes, some tax havens pose a greater threat in this process than others. Proactive methods that expose the money laundering aspect of espionage offer a new approach to the detection of potential spies. Reconstruction of the "paper trail" may also be valuable during the investigation of suspected individuals.

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### AN EVALUATION OF RESOURCE SHARING WITHIN TRICARE'S MANAGED CARE SUPPORT CONTRACTS

**Martin D. McCue-Lieutenant, United States Navy**

**B.S., University of Kentucky, 1987**

**Master of Science in Management-September 1996**

**Advisors: Joseph San Miguel, Department of Systems Management**

**James A. Scaramozzino, Institute for Defense Education Analysis**

To help reduce the overall cost of health care in the Military Health Services System, Managed Care Support Contracts include a provision known as Resource Sharing. Resource Sharing Agreements allow the contractor to provide personnel, equipment, or supplies to a military treatment facility to improve its capability to deliver health care. After reviewing civilian managed care programs, this thesis examines the Military Health Services System and its new managed care program known as TRICARE. Then the concept of Resource Sharing is examined and the process for identifying, evaluating, and using cost-effective Resource Sharing Agreements is discussed. Case studies of different types of agreements are used to illustrate the complexity and importance of cost and workload estimates and key contract factors in understanding the agreements. The findings suggest that the contractor's and government's performance data and assumptions underlying the agreements should be continuously monitored to ensure the cost-effectiveness of the agreements.

### MANAGERIAL CONTROL OF THE ARMY'S INTEGRATED SUSTAINMENT MAINTENANCE SYSTEM FROM A NATIONAL PERSPECTIVE

**Christopher Todd McCurry-Captain, United States Army**

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**Master of Science in Management-December 1995**

**Advisor: David F. Matthews, Department of Systems Management**

As the Department of Defense continues to face force and budget reductions, the Army must rise to the occasion and explore opportunities that will improve its level of wartime readiness within resource constraints. Senior Army leadership realized that one area needing substantial changes was the Army's maintenance procedures.

This thesis examines the Army's Integrated Sustainment Maintenance (ISM) program. As with any program, there is a certain amount of managerial control necessary to implement and execute the program. The primary focus of this thesis is to identify what agencies, within the Army, are capable of providing the centralized management of ISM at the national level and what functions/responsibilities the National Sustainment Maintenance Manager (NSMM) should perform.

ISM allows centralized management and decentralized execution of the Army's sustainment maintenance requirements through the consolidation of all sustainment maintenance activities under an integrated management structure. The goal of the concept is to maximize repair capabilities while providing high levels of operational availability for assigned weapon systems at a reduced cost. By balancing resource allocations, workload distributions, and decentralizing the execution of sustainment maintenance, ISM seeks to maximize repair capabilities and optimize the use of available resources.

### A COMPARATIVE ANALYSIS OF THE HIGHER COSTS PER FLIGHT HOUR OBSERVED IN FORWARD DEPLOYED NAVY SQUADRONS

**Michael P. McGarvey-Lieutenant, United States Navy**

**B.A., University of Notre Dame, 1984**

**Master of Science in Management-December 1995**

**Advisor: Lawrence R. Jones, Department of Systems Management**

This thesis is an in depth analysis of the higher costs per flight hour reported from Navy squadrons stationed in Japan. The purpose of the thesis is to identify, analyze and quantify the factors contributing to these higher costs. The study

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begins with a review of current Navy funding and reporting systems, and a description of the basic costs of operating Navy aircraft. Then, a direct comparison of maintenance and repair costs is made between the squadrons of three Navy air wings. The analysis includes factors determined to play a major role in raising costs, as well as other minor factors that were uncovered during the research. The thesis concludes with a summary of findings and areas recommended for further study.

### **A HISTORY OF SEALIFT AND FORCE SUSTAINMENT OPERATIONS DURING THE SOMALIA INTERVENTION (1992-1994)**

**John J. McGrath-Lieutenant, United States Navy**

**B.S., Georgia Institute of Technology, 1989**

**Master of Science in Management-March 1996**

**Advisors: Dan C. Boger, Department of Systems Management**

**David G. Brown, Department of Systems Management**

Military strategists expect U.S. forces to be involved in an increasing number of regional contingency operations of the sort conducted in Somalia from 1992 until 1994. The success of such large-scale humanitarian missions hinges on effective logistical operations, especially sealift. Planners of future missions, therefore, would greatly profit from the study of maritime operations during the intervention in Somalia.

This thesis thus provides a thorough chronology of events surrounding seaport operations at Mogadishu, Somalia. The work furthermore analyzes related logistical issues and problems in order to identify lessons learned from the expedition.

### **AN ANALYSIS OF COST OVERRUNS IN THE DEVELOPMENT**

### **OF THE NAVY'S A-12 AVENGER AIRCRAFT**

**Eric M. McKsymick-Captain, United States Army**

**B.S., Illinois State University, 1985**

**Master of Science in Management-December 1995**

**Advisors: Don R. Eaton, Department of Systems Management**

**David V. Lamm, Department of Systems Management**

This thesis examines the termination of the Navy's A-12 Program. Specifically, the research sought to answer the question: Were the A-12 Program's cost overruns exceptional when compared to other major acquisitions? Prior research indicated that most major programs experience some degree of cost variance. To determine if the A-12's overruns were exceptional, the A-12 Program is compared to 58 other contracts for developmental work. The conclusion of the research is the A-12's overruns were exceptional. The cost overruns in the A-12 Program, at termination, exceeded 97 percent of other programs examined. To complete the Program may have cost between \$9 and \$11 billion. The required budget adjustment to complete the A-12 Program was greater than 91 percent of other programs. The research found no difference between cost variances of fixed-price contracts and cost-type contracts. The assertion that the use of a fixed-price contract contributed to the failure of the program was not proven. There was also no statistical difference between the cost overruns of aircraft programs and other types of programs. The Government's decision to terminate the A-12 Program for cost overruns is justified, based on the sample of programs examined.

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### **THE IMPACT ON THE PURCHASE CARD PROGRAM OF INCREASING THE MICRO-PURCHASE THRESHOLD AND SIMPLIFIED ACQUISITION THRESHOLD WITHIN THE FEDERAL ACQUISITION STREAMLINING ACT OF 1994**

**Neal P. McMahon-Lieutenant Commander, Supply Corps, United States Navy**

**B.S., Saint John Fisher College, 1985**

**Master of Science in Management-December 1995**

**Advisor: Sandra M. Desbrow, Department of Systems Management**

This thesis examines the impact on the purchase card program of increasing the Micro-purchase Threshold and Simplified Acquisition Threshold within the Federal Acquisition Streamlining Act of 1994. A risk assessment will be conducted to compare purchase card programs of the respective Services within the Department of Defense. The thesis will emphasize the affect of the Federal Acquisition Streamlining Act of 1994 upon the management, policies, and procedures of the purchase card program. Moreover, barriers and possible difficulties in implementing the Simplified Acquisition Threshold within the purchase card program will be discussed. Lastly, recommendations will be proposed for successful implementation and guidance for using the General Services Administration Governmentwide Commercial Purchase Card Program.

### **JIT PURCHASING: A GUIDE FOR SUCCESSFUL IMPLEMENTATION WITHIN THE DOD**

**Michael B. McPeak-Lieutenant Commander, United States Navy**

**B.S., Franklin University, 1984**

**Master of Science in Management-December 1995**

**Advisor: Mark Stone, Department of Systems Management**

Just-In-Time purchasing is a materials management system that has been successfully implemented in various commercial and Government entities in recent years. The major issue in this thesis is: "What are the elements that ensure successful implementation outcomes between the Government purchasing offices and various commercial contractors?" The objective is to determine the critical elements for implementing a Just-In-Time purchasing operation. The intent is to provide a guide for implementing Just-In-Time purchasing so other agencies can duplicate the success of this process. The Just-In-Time purchasing process substantially reduces inventories through electronic order placement, long-term contracts, and direct delivery from the vendor to the user. The Department of Defense can capture these benefits by implementing Just-In-Time purchasing in all Government purchasing offices.

### **AN EVALUATION OF USING THE NOISE-TO-SIGNAL RATIO TO DETERMINE THE SMOOTHING CONSTANT IN EXPONENTIAL SMOOTHING FOR INVENTORY CONTROL**

**Michael E. Meadows-Lieutenant, United States Navy**

**B.S., Park College, 1991**

**Master of Science in Management-June 1996**

**Advisor: Paul J. Fields, Department of Systems Management**

This research evaluates the use of the noise-to-signal ratio to determine the optimal smoothing constant (alpha) in exponential smoothing for inventory control. As the Navy continues the transition of "right-sizing," inventory managers are faced with fewer personnel and operating funds. Controlling inventory expenditures through an aggressive approach to demand forecasting could be an opportunity to promote efficiency.

The author examines the use of the noise-to-signal ratio to develop a simple, yet effective way to choose the smoothing constant. The new adjusted exponential smoothing method is then validated through a series of comparisons with the traditional method of exponential smoothing currently in use for demand forecasting.

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### **AN EVALUATION OF ORGANIZATIONAL CULTURE AT THE MILITARY SEALIFT COMMAND**

**Matthew A. Merritt-Lieutenant Commander, Supply Corps, United States Navy**

**B.S., Virginia Polytechnic Institute and State University, 1985**

**Master of Science in Management-June 1996**

**Advisors: Susan P. Hocevar, Department of Systems Management**

**Gail Fann-Thomas, Department of Systems Management**

This thesis assesses organizational culture, values and behaviors for the Military Sealift Command. Survey data were gathered from 674 MSC shore-based personnel (reflecting a 57.7% response rate). The survey asked employees to rate their organization regarding the culture, values and practices that best contribute to successful organization performance at four levels in the organization: globally, local command, individual and supervisor. Independent variables measuring such values as support for innovation, customer focus, information sharing, cooperation and teamwork were all found to be significantly correlated to the dependent variables of organizational performance, individual performance, individual job satisfaction, organizational commitment and stress.

Survey results were compared with theoretical organizational culture models, management predictions, and the identified executive desired values for the reinvented MSC. Results indicate a relatively balanced culture following the Competing Values model. Analysis examines differences by geographic location and military versus civilian personnel sub-cultures. Results are discussed highlighting the relative strength and weaknesses of various aspects of organizational culture. Recommended improvements in organizational communication, honesty, teamwork, innovation will increase organizational effectiveness, individual performance effectiveness, individual job commitment, individual job satisfaction and reduce stress are presented. Recommendations are offered for further research.

### **INTERNATIONAL TECHNOLOGY TRANSFER: A CASE ANALYSIS OF THE MULTIPLE LAUNCH ROCKET SYSTEM AND THE PATRIOT MISSILE SYSTEM**

**Karl R. Meuschke-Major, United States Army**

**B.S.M.E., Pennsylvania State University, 1982**

**Master of Science in Management-June 1996**

**Advisor: David F. Matthews, Department of Systems Management**

**Second Reader: Orin E. Marvel, Command, Control, and Communications Academic Group**

Acquisition strategies incorporating international cooperation have been gaining favor in DoD's weapon system procurements over the past ten years. This strategy is used to reduce life-cycle costs, improve global equipment interoperability, and foster international political unity. A by-product of international cooperation is normally some form of technology transfer between the countries involved in the cooperative effort. The purpose of this thesis is to identify and analyze the U.S. Project Office's role in enacting international technology transfers. This thesis focused on two successful cooperative projects: the Multiple Launch Rocket System and the PATRIOT Missile System. Both weapon system acquisitions provided valuable insights into the complexities which surround international technology transfers. The principal findings are that clear and concise planning, coupled with an understanding of the U.S. licensing and transfer system, are critical to successfully executing a given transfer. Three primary recommendations are that: PM's identify "transfer-smart" personnel early in the process; once identified, those personnel be trained on both the intricacies of the transfer process and its influencers; and that the PM act as a political buffer, aggressively addressing the many issues that will surface during an international technology transfer.

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### ANALYSIS OF STANDARDIZED BAR CODING AND THE USER/BUYER ELECTRONIC CATALOG'S POTENTIAL FOR EFFECTIVE CHANGE WITHIN THE DEPARTMENT OF DEFENSE

**David C. Meyers-Lieutenant Commander (sel), United States Navy**

**B.S., University of California at Davis, 1984**

**Master of Science in Information Technology Management-March 1996**

**and**

**Daniel A. Palko-Lieutenant Commander, United States Navy**

**B.S., Bloomberg State College, 1982**

**Master of Science in Information Technology Management-March 1996**

**Advisors: David G. Brown, Department of Systems Management**

**Alice Crawford, Department of Systems Management**

The Department of Defense has been relying on business practices and material management methods that date back to the 1940's and before. Once the premier innovator in the field of logistics, the DoD has fallen woefully behind commercial businesses in the past few decades. Advances in Electronic Commerce/Electronic Data Interchange (EC/EDI) technology have far out paced the DoD's ability to keep up. Challenged by President Clinton in 1994 to reinvent government and to modernize and streamline business practices, the DoD has since been studying applications of EC/EDI that will allow them to integrate successful logistics ideas into DoD operations. This thesis examines an exciting application of EC/EDI currently under review, the Electronic Catalog, and its potential impact as a catalyst for change within the DoD. Reviewing 3M Corporations operational CONNECTSUS User/Buyer Electronic Catalog system against proposed Defense Logistics Agency initiatives, this thesis looks at the benefits to be gained by the DoD. Integral to the thesis is a review of standardized bar coding and how it fits into, and enhances, EC/EDI.

### A USER'S MANUAL FOR THE COST EFFECTIVENESS ANALYSIS MODEL (CEAMOD) VERSION 3.0

**Mario Mifsud-Lieutenant, United States Navy**

**B.A., University of Arizona, 1988**

**Master of Science in Management-September 1996**

**Advisors: Paul J. Fields, Department of Systems Management**

**William R. Gates, Department of Systems Management**

This thesis develops a comprehensive procedures manual for Version 3.0 of the Cost Effectiveness Analysis (CEA) Model. The CEA Model is used in each service's Component Improvement Program (CIP) as a means of doing cost effectiveness analysis on Engineering Change Proposals (ECPs) for aircraft engines. The model uses expected values to calculate changes in life cycle costs that result from implementation of the ECP. A detailed analysis of the spreadsheet's calculations is provided to explain to users the model's logic. This comprehensive manual covers the model's history, assumptions, limitations and format. Each worksheet of the model is described in detail including its purpose, explanations of each column, associated cell formulas and the logic behind them. The appendix provides a sample of each page of the CEA Model printout.

**Lauren R. Mihlon-Major, United States Marine Corps**

**B.S., United States Naval Academy, 1985**

**Master of Science in Information Technology Management-September 1996**

**Advisors: Don Brutzman, Undersea Warfare Academic Group**

**Rex Buddenberg, Department of Systems Management**

Internetworking is the ability to seamlessly interconnect multiple dissimilar networks globally using the Internet (Brutzman, 96). In order to achieve this network, data links need to provide data speeds which allow the applications to function properly. Many important networked applications require high bandwidth to perform effectively.

This thesis presents an analysis of Basic Rate Interface (BRI) Integrated Services Digital Network (ISDN) as a data link technology for extending Local Area Network (LAN) connectivity. Hardware and software capabilities are pre-

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sented in detail. A representative "ISDN user needs analysis" is also provided. A study is made of an ISDN installation and implementation to determine if ISDN is a viable solution to extending LAN connectivity.

Considerations of particular importance include Internet Protocol (IP) compatibility, bonding separate channels to act as a single 128 Kbps logical channel, and native support for IP multicast addressing. Experimental results indicate that ISDN meets most essential requirements.

### **MEDICARE SUBVENTION AND THE MILITARY HEALTH SERVICES SYSTEM**

**Bruce M. Miller-Lieutenant, United States Navy**

**B.P.S., University of New York, 1987**

**Master of Science in Management-December 1995**

**Advisor: Richard B. Doyle, Department of Systems Management**

This thesis examines Medicare Subvention and the effects it would have on the Military Health Services System. Current Medicare Subvention legislation is identified and reviewed. The role on the Health Care Financing Administration and how it relates to Medicare and Medicare Subvention is addressed. Improving access to care for military Medicare-eligible retirees and authorizing Military Treatment Facilities to bill for the health care services provided to this group are the primary advantages that Medicare Subvention would provide. The thesis concludes that approval and implementation of Medicare Subvention would have positive effects on medical readiness, access to care for military Medicare-eligible retirees, and Medicare. Furthermore, not passing Medicare Subvention would negatively impact medical readiness and access to care for retirees age 65 and over.

### **INTERNETWORKING: EXTENDING LOCAL-AREA NETWORK (LAN) CONNECTIVITY USING ISDN**

### **METHODS FOR DETERMINING PERFORMANCE EXPECTATIONS AND OPTIMAL NO BUILD TIMES FOR FIELDDED JET ENGINES**

**Mark Edward Mlikan-Lieutenant Commander, United States Navy**

**B.S., Pennsylvania State University, 1984**

**B.A., University of Maryland, 1993**

**Master of Science in Management-June 1996**

**Advisor: W. M. Woods, Department of Operations Research**

**Second Reader: Don Eaton, Department of Systems Management**

This thesis investigates methods for determining fielded jet engine performance goals. Data exported from the Naval Aviation Logistics Data Analysis (NALDA) data base was fitted by a Weibull distribution to obtain the engine probability density function, cumulative density function, mean time between failure, failure rate, and conditional reliabilities. The thesis applies the results of the data analysis by using a commercial software package, Mathcad, to find the solution to an optimizing equation for average maintenance cost per hour of engine critical component operation. The solution yields optimum no build times given the component's Hard Time, ratios of several inspection/repair cost factors, and properties of the failure time probability distributions of the engine and component. The goal is to economize resources by inspecting life limited components when they are available after having accumulated a predetermined number of operating hours. The procedures developed can be used for any aircraft engine or any mechanical component with data that can be fitted to a Weibull distribution and with maintenance cost ratios that fit the model presented herein.

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### **THEATER BALLISTIC MISSILE DEFENSE: MODELING AND ANALYSIS OF THE MARINE CORPS "HAWK" MISSILE DEFENSE SYSTEM**

**William James Fredrick Monroe-Captain, United States Marine Corps  
B.A., University of Arizona, 1989**

**Master of Science in Information Technology Management-December 1995**

**Advisor: Carl R. Jones, Department of Systems Management**

This thesis develops the concept of integrating IDEF modeling with matrix analysis to explore the current state of the Marine Corps, "As Is", Theater Ballistic Missile Defense information architecture. It demonstrates the possibility of using matrix analysis in conjunction with IDEF modeling to identify deficiencies within an existing information architecture. Using this framework, new technologies and advancements can also be measured to ensure they accurately address deficiencies identified in the analysis. Additionally, this thesis incorporates the knowledge garnered from this analysis into a possible, "To Be", physical architecture for the year 2002. It examines the "As Is" physical architecture, technological advances, and environment enhancements, and proposes one possible infrastructure for future theater missile defense.

Models have traditionally been developed as analysis vehicles which conform only to administrative processes. This led to minimal utilization of the application and its capabilities. Matrix analysis allows for accurate investigation and documentation of information and systems useful in the development of new technologies. This thesis demonstrates that modeling, combined with matrix analysis can also be incorporated for tactical processes.

### **TACTICAL DMS: A GLOBAL BROADCAST SERVICE OPTION**

**Jose I. Morales-Lieutenant, United States Navy  
B.S., United States Naval Academy, 1989**

**Master of Science in Systems Technology-June 1996**

**Advisors: Donald Wadsworth, Department of Electrical and Computer Engineering**

**Rex Buddenberg, Department of Systems Management**

**Carl Jones, Department of Systems Management**

This thesis presents one possible method of integrating the DMS and GBS systems. This effort is undertaken in order to explore how the DMS messaging capability can be extended to the mobile, tactical user via a new, more robust broadcast subsystem. The Navy's current Fleet Broadcast subsystem is not prepared to handle the increased traffic load expected from the conversion to DMS-based messaging. The application of GBS as a "next generation" Fleet Broadcast offers an expansive leap in tactical broadcast communication capability.

DMS broadcast to the tactical environment via GBS is achieved through the application of relatively new, commercially developed network addressing and mobile-user routing protocols. Adaptation of a broadcast messaging capability into the DMS is also incorporated. Incompatibility issues are resolved at the transport and network layers instead of higher-layer data format conversion. The proposed communications architecture provides for a high data-rate message broadcast system, capable of carrying DMS traffic to mobile units.

### **AUTOMATED MESSAGING FOR THE GLOBAL COMMAND AND CONTROL SYSTEM:**

#### **ANALYSIS OF UPGRADING COMMUNICATIONS IN THE NPS SECURE SYSTEMS**

**TECHNOLOGY LABORATORY (SSTL)**

**Shenae Y. Morrow-Lieutenant, United States Navy  
B.S., Colorado State University, 1987**

**Master of Science in Information Technology Management-September 1996**

**Advisors: Gary Porter, Command, Control and Communications Academic Group**

**Carl R. Jones, Department of Systems Management**

The Global Command and Control System (GCCS) is currently operational in the Secure Systems Technology Laboratory located in Root Hall at the Naval Postgraduate School. All subsystems of GCCS are operational with the excep-

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tion of the Automated Message Handling System (AMHS). The SSTL's efforts to obtain an operational GCCS AMHS depends on the future availability of the Automated Defense Information Network (AUTODIN), and the emerging technology of the Defense Message System (DMS). This thesis examines and compares GCCS AMHS and DMS and the implementation requirements for each. This thesis draws the conclusion that DMS is the dominant system over GCCS AMHS and continues to examine the acquisition strategies and costs required to implement the DMS in the SSTL.

### **CONGRESS, DEFENSE, AND THE DEFICIT: AN ANALYSIS OF THE FY 1996 BUDGET PROCESS IN THE 104TH CONGRESS**

**Francis X. Murphy Molinari-Lieutenant, United States Navy**

**B.A., George Washington University, 1986**

**Master of Science in Management-December 1995**

**Advisor: Richard B. Doyle, Department of Systems Management**

The FY 1996 federal budget process has been distinguished by a series of unprecedented "firsts." The 104th Congress, the first Republican-led Congress in over 40 years, promised to produce a federal budget for FY 1996 that would incorporate significant changes in fiscal policy. Congress intended to balance the budget and eliminate the deficit by 2002, and proposed substantial cuts in entitlement spending in order to accomplish this. Additionally, Congress intended to cut taxes and increase funding for defense. Although the majority party believed that balancing the budget was possible, most students of the federal budget process considered it improbable given the competing objectives and political sensitivities surrounding the methods proposed to achieve this goal. This thesis describes how Congress attempted to achieve its objectives, and evaluates the impact of such an unprecedented economic plan on specific elements of the federal budget. Congress did pass a budget resolution, reconciliation package, and several appropriation bills that reflected a zero deficit by 2002. However, two Continuing Resolutions were required as Congress and the President continued negotiations after reaching an impasse on the FY 1996 federal budget.

### **REVIEW OF THE ECONOMIC VALUE OF EXCESS NAVAL AIRCRAFT AT THE AEROSPACE MAINTENANCE AND REGENERATION CENTER**

**John E. Murphy-Commander, United States Navy Reserve**

**B.S., University of Massachusetts, 1980**

**Master of Science in Management-September 1996**

**Advisor: William R. Gates, Department of Systems Management**

**Second Reader: Michael W. Morris, Department of Systems Management**

The Aerospace Maintenance and Regeneration Center (AMARC) stores aircraft that are determined to be excess. These aircraft are preserved awaiting future regeneration, sale to foreign governments, reclamation of their components, or disposal. The present programs provide substantial return to the Department of Defense. The primary objective of this study is to review the present system and develop recommendations to optimize the financial return.

To address this issue, interviews were conducted with key personnel in AMARC, the Navy, and DRMO. Current instructions were reviewed, and required data was collected. Analysis of the data and structure of the process revealed many areas which could be improved. The recommendations involve both immediate and long-term financial benefits, and include; more efficient disposition planning for newly arriving and stored aircraft, increasing the effectiveness of the reclamation program, adopting aggressive marketing techniques and incentive plans for aircraft parts sale, and stabilizing the United Standard Price (USP). Implementing any of the recommendations should provide a higher return on excess aircraft and aircraft parts than is presently realized.

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### **CASE STUDY: AN EXAMINATION OF THE ROLE OF THE PROJECT MANAGER DURING THE FOREIGN MILITARY SALE OF THE MULTIPLE LAUNCH ROCKET SYSTEM TO ISRAEL**

**James M. Myers-Captain, United States Army**

**B.S., Troy State University, 1990**

**Master of Science in Management-June 1996**

**Advisors: David F. Matthews, Department of Systems Management**

**Orin E. Marvel, Command, Control, and Communications Academic Group**

The role of leadership in the international community has taken on a new meaning for the United States in the post Cold-War Era. American engagement and leadership are just as important today as they were during the Cold-War Era because we confront an interdependent world in which the line between our concerns at home and our interests abroad is increasingly blurred. The United States offers Security Assistance to strengthen the national security of friendly nations, support existing or prospective democratic institutions, and market-oriented economies. In some instances, we can leverage our power and resources through alliances and multinational institutions. We have a stake in helping our allies to strengthen their own defenses so that they can share the common defense burden. Even in times of shrinking domestic defense budgets, and a "downsizing" defense industrial base, the U.S. will continue to be the world leader in the transfer of defense articles and services to meet our foreign policy objectives. An examination of the role of the Project Manager is critical to increasing the efficiency of the Foreign Military Sales process. The functional management role of the Project Manager is vital to the success of FMS transactions. By closely examining the FMS case of the MLRS to Israel, we can further develop and refine the FMS process. Adoption of the recommendations of this thesis will help to improve project management and support future FMS transactions.

### **THE MARINE CORPS MILITARY ACQUISITION WORKFORCE:**

**A CAMPAIGN PLAN FOR THE FUTURE**

**Bruce W. Neuberger-Captain, United States Marine Corps**

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**Master of Science in Management-March 1996**

**Advisor: Sandra M. Desbrow, Department of Systems Management**

Public Law 101-510, the Defense Acquisition Workforce Improvement Act (DAWIA), became effective upon its passage in Fiscal Year 1992. The legislation was designed to increase the training and professionalism of the Department of Defense Acquisition Workforce. DAWIA outlines specific requirements and qualifications for various specialties within the General Series (GS) workforce and states requirements for the qualifications of military personnel who are filling acquisition billets.

This thesis focuses on the Marine Officers currently working in the acquisition workforce. It analyzes how they are accessed and trained within the workforce. It also examines current career progression and makes recommendations as to how the current acquisition workforce structure should be modified in order to remain viable well into the next century.

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### THE DIGITAL LIBRARY PHENOMENON: OPPORTUNITIES AND IMPLICATIONS FOR THE NAVAL SERVICE

Robert E. Norris-Commander, United States Navy

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Master of Science in Information Technology Management-September 1996

and

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Advisors: Hemant K. Bhargava, Department of Systems Management

George Zolla, Special Assistant, Naval Postgraduate School

This thesis examines the emerging field of work encompassed by the term "Digital Library," and offers a plan for developing a Naval Service Digital Library. The amount of data and processing capabilities, available via networking technology, already defies description and continues to grow daily. As access to electronic resources and their diversity increase, a void in electronic Information Management principles and technologies has been uncovered. Participants in the global Digital Library (DL) movement are striving to adapt the principles of Library Science from locally controlled and accessed resources (books, magazines, videos, etc.) to remotely-shared electronic media and data processing systems. This thesis specifically addresses the movement's background, current initiatives and technologies (circa 1996).

The Naval Service can benefit immediately from monitoring and exploiting the DL technologies being developed world-wide. There are tremendous economies to be reaped in meeting our non-tactical, day-to-day information needs. To date, Navy and Marine Corps DL-related projects are narrowly focused by organization and limited to tactical, engineering and research information needs. By consolidating these efforts with a unifying vision and cooperative intent, a Naval Service Digital Library (NSDL) can be constructed. The NSDL would benefit all service members, in both their professional and personal lives, by providing a gateway to millions of resources that are compatible, searchable and ready for use. This thesis recommends an organizational structure and management strategy for developing a Naval Service Digital Library.

### IMPLEMENTATION OF AN INCENTIVE BASED RECRUITING SYSTEM WITHIN THE UNITED STATES ARMY RECRUITING COMMAND

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Master of Science in Management-June 1996

Advisors: Katsuaki L. Terasawa, Department of Systems Management

Keebom Kang, Department of Systems Management

The United States Army Recruiting Command (USAREC) came under the scrutiny of the United States Congress due to the size of their operations budget and the decreasing productivity of the recruiting forces. Due to this scrutiny, the GAO recommended that USAREC revise their quota based recruiting system because they found it to be inefficient. A quota based recruiting system only considers the future personnel needs of the Army, and it is inefficient because it does not take into account environmental factors or the full potential of the personnel market.

In this thesis, we present the Production Recruiting Incentive Model (PRIME), designed to improve the efficiency of the recruiting process. The purpose of the PRIME is to motivate recruiters to access the maximum number of quality recruits possible during a period of time. The PRIME facilitates the capture of true market data in a region for USAREC. Recruiters predict the number of recruits they expect to access and USAREC can track the data and, over time, derive an accurate database of the true market potential in an area. These new data can be used to effectively manipulate the PRIME's optimum bonus points range to influence the quantity and quality of personnel accessed to fill the Army's needs. The data can also be used to realign and reassess the overhead cost associated with recruiting quality soldiers.

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### **MANAGEMENT AND OPERATIONS CONTRACTS: A BETTER ALTERNATIVE FOR MPF MAINTENANCE**

**Robert G. Oltman-Major, United States Marine Corps**

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Management and Operations Contracting is a special contracting method that has been used by the Department of Energy with great success. It is a contractual vehicle that allows the Government to enter into an indefinite contractual relationship with the contractor. The primary question of this thesis is whether a Management and Operations contract could be utilized successfully to perform the requisite contract requirements under the Maritime Prepositioned Force (MPF) Program. The objective of this study is to analyze Management and Operations contracting as an alternate to the Option Year Contracting currently utilized. By comparing and contrasting these two procurement methods, it was established that a Management and Operations contract is a more cost effective and productive tool to meet the program's mission needs. The research revealed that Management and Operations contracting will produce significant benefits over the Option Year Contracting currently used. This study finds that Management and Operations contracting should be used in the MPF Program to ensure that the United States improves a critical element of the Marine Corps amphibious capability to respond to the challenges of the 21<sup>st</sup> Century.

### **MATRIX ORGANIZATIONAL STRUCTURE AND ITS EFFECT ON ARMY ACQUISITION PROGRAM MANAGEMENT OFFICES**

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**Second Reader: Orin Marvel, Command, Control, and Communications Academic Group**

With the implementation of the Defense Management Review, and publications of DoD Directive 5000.1 and DoD 5000.2-R, the Army was mandated to restructure program offices and operating procedures with the intent of cutting waste and fraud within the defense acquisition process. The goal was to establish an organizational structure which could operate efficiently in an environment of shrinking budgets and increasing technical specialization. To address this challenge, the Army followed the aerospace industry's lead, and adopted the matrix management structure. Since its implementation, the matrix structure remains the management structure of choice within acquisition program offices throughout the Army.

While the structure has remained effective, its efficiency remains a point of contention with many program managers. This thesis focuses on evaluating the strengths and weaknesses of the matrix structure within acquisition program offices. In addition, the comments of 18 program managers will be offered regarding some possible methods and organizational variants which can be used to improve the matrix structure within acquisition program offices.

### **SYSTEM ARCHITECTURE FOR THE ARMY SPECIAL OPERATIONS FORCES (ARSOF) SOLDIER SYSTEM**

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**Master of Science in Management-June 1996**

**Advisors: Orin E. Marvel, Command, Control, and Communications Academic Group**

**Keith F. Snider, Department of Systems Management**

This thesis is based on proposing a system architecture for the Army Special Operations Forces (ARSOF) soldier. This system architecture will be based on object orientation and include Quality of Life (QOL) and Base Operations (BASOPS) programs integrated into the system architecture. The primary focus for this thesis is to propose a method or architec-

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ture to portray the ARSOF soldier as a system so that it can adequately compete against other weapon systems. The second reason is to identify and prioritize those functions and material which have an effect on the soldier and his mission accomplishment. It is a concern that the ARSOF soldier is being left out of the acquisition process because it is not perceived as a weapon system. This leaves the soldier vulnerable to inadequate funding which ultimately results in an ill-equipped and degraded capability for accomplishing present and future missions. USASOC wants to include not only material systems as part of the ARSOF soldier but also other intangible issues such as quality of life systems and base operations systems which have an effect on the ARSOF soldier's combat effectiveness. Army Special Operations requires specially trained soldiers and unique equipment that is not utilized by conventional forces. This system architecture will take special requirements into account. If the Army Special Operations soldier can be portrayed as a system, USASOC wants to determine how much of that system it has control or influence over, and how much it does not.

### **MANAGEMENT AND ACCOUNTING OF GOVERNMENT-FURNISHED PROPERTY IN TODAY'S ARMY ACQUISITION PROGRAMS**

**John R. Oxford Jr.-Major, United States Army**

**B.S., University of Georgia, 1984**

**Master of Science in Management-December 1995**

**Advisor: John T. Dillard, Department of Systems Management**

**Second Reader: Mark W. Stone, Department of Systems Management**

One area of Government acquisition which has recently received special attention from Congress and the Department of Defense is the management and accounting for Government-Furnished Property. This facet of Government acquisition is also under great scrutiny as an entire Process Action Team was assigned to examine and make recommendations for the Federal Acquisition Regulation Part 45 Rewrite Team established by the Director, Defense Procurement, Eleanor Spector. Government-Furnished Property was also debated during the recent 1995 Defense Acquisition Research Symposium. The intent of this thesis is to understand why Government-Furnished Property is used, how the use of Government-Furnished Property can assist an Army Program Manager save in costs and operate more effective, and document needed changes to current regulations, policies, oversight, and staffing. The focus of the research was to visit and survey Army acquisition agencies and their Defense contractors to document their current concerns and comments for the use of Government-Furnished Property in their specific programs.

### **NETWORKING REQUIREMENTS ANALYSIS FOR ENGINEERING 2000**

**Christopher James Page-Lieutenant, United States Navy**

**B.A., University of Virginia, 1988**

**Master of Science in Information Technology Management-March 1996**

**and**

**Jean Drury Reese-Captain, United States Marine Corps**

**B.A., Ohio State University, 1989**

**Master of Science in Information Technology Management-March 1996**

**Advisors: Norman F. Schneidewind, Department of Systems Management**

**Martin J. McCaffrey, Department of Systems Management**

The Cruise Weapons community wants to evaluate its baseline network and define the characteristics of its Engineering 2000 target network. In this thesis, we develop and execute a methodology for completing these actions. By following this methodology, we compare the community's current requirements with its current capabilities to produce our baseline evaluation. Then, we predict the future requirements and capabilities. From this, we produce our target definition. In our baseline evaluation, we find that the current network does not provide sufficient reach, range, responsiveness, user support, or workgroup support. In addition, we find that it is too complex to maintain or manage effectively. In our target definition, we determine that the future network should be a simple, centrally managed and maintained system that supports all users, including afloat customers and mobile employees. Furthermore, we determine that the

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network should handle simple messages, multi-version documents, and engineering drawings. In order to provide these capabilities, we recommend that the community streamline its applications suite, discard unnecessary computing assets, produce formal maintenance and management policies, and establish a network operations center. In addition, we recommend that the community implement peer-to-peer networking systems within workgroups, take advantage of upgrading LAN technology at the local level, and continue working with DoD service providers for wide area communications.

### **FINANCIAL TRANSACTION MECHANISMS FOR WORLD WIDE WEB APPLICATIONS**

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**Master of Science in Information Technology Management-March 1996**

**Advisor: Hemant Bhargava, Department of Systems Management**

The World Wide Web is the fastest growing application of the Internet. Its continual growth has provided a new electronic medium for commerce. One of the more exciting uses of the World Wide Web in commerce is the selling of information, instead of goods. A major obstacle that the World Wide Web in general and information sellers specifically face for commercialization is secure means in conducting financial transactions. This thesis' objective is to develop a criteria for individuals to use in the evaluation of the different financial transaction mechanisms that are becoming available on the World Wide Web.

Two of the leading financial transaction mechanisms available today, First Virtual and Netbill are analyzed in detail and compared on the basis of these criteria. This analysis is then applied to Decision Net. While First Virtual's is further along in the development process, Netbill promises to offer better features to the meet Decision Net's requirements.

### **QUALITY ASSURANCE FOR 1200 PSI STEAM BOILER MAINTENANCE BY COMMERCIAL CONTRACTORS**

**Vasilios K. Papaikovou-Lieutenant Commander, Hellenic Navy**

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**Master of Science in Management-December 1995**

**Advisor: Paul J. Fields, Department of Systems Management**

This thesis compares military, commercial, and international quality assurance standards and uses the framework of Dr. W. Edwards Deming's philosophy of management to evaluate and set appropriate quality assurance standards the Hellenic Navy should include in contracts with commercial contractors for 1200 psi steam boiler maintenance. The Hellenic Navy could experience long term benefits by implementing ISO 9002 quality assurance standards in all production and service contracts.

### **A DATABASE APPROACH TO MAINTAINING THE INFORMATION TECHNOLOGY MANAGEMENT GROUP FACULTY RESEARCH CATALOG ON THE WORLD WIDE WEB**

**Vera Parker-Lieutenant, United States Navy**

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**Master of Science in Information Technology Management-September 1996**

**Advisors: Hemant K. Bhargava, Department of Systems Management**

**Suresh Sridhar, Department of Systems Management**

This thesis documents the development of an on-line information technology management (ITM) research catalog that can be accessed by DoD and DoN agencies or other interested parties via the World Wide Web. The on-line research catalog allows the ITM professors at the Naval Postgraduate School (NPS) to quickly and easily maintain their own research information regardless of their operating platform.

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The logic for a multi-user relational database approach to managing the research catalog is addressed. A semantic object model and a relational diagram are developed to create a conceptual design for the database. Next, the application process and description of the common gateway interface (CGI) scripts are presented. Chapter four displays and discusses the catalog's major user interfaces. Finally, this thesis concludes with a plan for using the system and recommendations for further improvements.

### **A COMPARATIVE EFFICIENCY ANALYSIS OF THE POINT FIVE FLSIP COSAL INVENTORY MODEL**

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**David G. Brown, Department of Systems Management**

As the Department of Defense continues to downsize as a result of various budget reduction initiatives, new, efficient methods must be devised and implemented to increase fleet customer service without degrading readiness. The Navy's Inventory Control Point-Mechanicsburg (NAVICP-M) Point Five FLSIP (.5F+) COSAL inventory model was designed to meet that challenge. This thesis describes the .5F+ model and its impact on readiness. It then compares that model to a private-sector, not-for-profit, inventory control point, the Materials Management Department of the Salinas Valley Memorial Hospital (SVMH). The techniques that each organization uses to efficiently distribute scarce resources, maximizing both effectiveness and customer service levels while minimizing costs, were analyzed to identify potential crossover defense-related applications. This thesis also analyzes some of the required trade-offs for each inventory management program. The research shows that SVMH has a more efficient inventory management program because of their customer-oriented strategic planning. DoD could increase their customer effectiveness, efficiency, and readiness by adopting a similar approach.

### **SOLUTIONS FOR RELIABLE MULTICASTING**

**David G. Pettit-Major, United States Marine Corps**

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**Master of Science in Information Technology Management-September 1996**

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**Suresh Sridhar, Department of Systems Management**

Many of the applications that will be hosted on the Marine Corps' Tactical Data Network (TDN) require data to be delivered reliably from one sender to many receivers. Reliable multicast protocols are better suited for this one-to-many communication than conventional transport layer unicast protocols. These multicast protocols will have to contend with the limited bandwidth and high bit error rates of wide area links in the tactical internet. They must also adapt to the internet's changing topology, and be robust enough to survive its inevitable disruptions.

This thesis evaluates several reliable transport layer multicast protocols for their ability to deliver data reliably over a tactical Internet. Because multicast routing protocols build delivery trees for these protocols, they are also evaluated.

The bandwidth saved by multicast protocols make them particularly valuable in the tactical internet. However, at both the network and transport layers, no single protocol satisfies all the requirements of the internet. Which protocols are selected for TDN depends on how the decision maker weighs the requirements of the tactical internet. The types of tactical data systems will also influence the choice of a multicast routing protocol. Similarly, the reliable multicast protocols which are selected must meet the demands of the application for which they were designed while still operating within the constraints imposed by the tactical internet.

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### DEVELOPING HIGHLY EFFECTIVE MARINE LEADERS

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**Master of Science in Management-December 1995**

**Advisor: James E. Suchan Department of Systems Management**

Warfare in the 21<sup>st</sup> Century will move down two divergent paths. On the one hand, it will reflect many of the characteristics seen in the Gulf War: decentralization of the battlefield, four dimensional theater, utilization of high-tech weapons, quick tempo, and an overabundance of information flow. On the other, it will reflect the recent occurrences referred to as Operations Other Than War. Here, war is not the primary medium of conflict. The diversity in warfare will create many demands for Marine leaders that will necessitate the identification of specific *needs* that Marine leaders will need to fulfill. This thesis addresses the *needs* all Marine leaders will face, and explains why an integration of Stephen R. Covey's *The Seven Habits of Highly Effective People* with *Principle-Centered Leadership* will fill those needs. Not only would this integration enhance Marine leadership but it would also create the necessary foundation at the personal and interpersonal levels for success. Once the Marine's foundation is established, the managerial and organizational levels of the Marine Corps have the framework in place for creating and maintaining a principle-centered alignment that will increase all Marine leadership ability as the 2<sup>nd</sup> Century approaches.

### PROCESS VALUE ESTIMATION AT PACIFIC BELL

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The purpose of this thesis is to demonstrate the implementation of the Process Value Estimation methodology now being pioneered at Pacific Bell. The principles of Process Value Estimation are applied to the Network Surveillance Division of Pacific Bell in a field study. There are two main component processes of Network Surveillance. Classification is an automated process, and Decision Making is a manual process. The thesis uses Process Value Estimation to describe the processes in terms of work accomplished. This description permits the comparison of the value of the two processes. This is the first major field study using the Process Value Estimation method.

### AN EVALUATION OF TRANSFER PAYMENTS WITHIN THE MILITARY HEALTH SERVICES SYSTEM

**Alan Lee Portis-Lieutenant, Medical Service Corps, United States Navy**

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**Master of Science in Management-June 1996**

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**Donald E. Summers, Department of Systems Management**

Under the Department of Defense's (DoD) modified capitation resource allocation system, there are incentives to shift costs to other components of the Military Health Services System (MHSS). In the transition to capitation budgeting, the Office of the Assistant Secretary of Defense of Health Affairs (OAS/HA) published the Transfer Payment policy in 1995 to ensure the equitable transfer of funds between the Services and Military Treatment Facilities (MTFs). This thesis begins by providing background on the MHSS direct care system, TRICARE Program, and DoD's modified capitation resource allocation methodology. Since the methodology of transfer payments is based on data from currently utilized information systems, this thesis contains a discussion of those systems as well as those planned for deployment. The relevant prospective payment system (PPS) costing factors used in determining a transfer price are also examined. Case studies are used to illustrate when a transfer payment would occur and what computations are employed in determining the amount of funds to transfer. Although the policy was designed to provide for an equitable

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transfer of funds, it has been the subject of much debate. Consequently, this thesis examines the major implementation issues and current effectiveness of the policy itself.

### **IMPLEMENTING A DECISION SUPPORT SYSTEM ON THE WORLD WIDE WEB**

**Patrick E. Protacio-Lieutenant Commander, Supply Corps, United States Navy**

**B.S., United States Naval Academy, 1983**

**Master of Science in Information Technology Management-March 1996**

**Advisor: Hemant K. Bhargava, Department of Systems Management**

As the popularity and use of the World Wide Web (the Web) increases daily, many technologies and applications that were initially developed and used as stand alone tools are migrating towards the Web. Decision support technologies are examples of applications that traditionally have been developed as stand alone systems. One feature common to all decision support systems is that they require user input to produce results. However, due to some inherent limitations with the Web, some modifications must be made to allow users to interact with these technologies. Common Gateway Interface (CGI) programs, or scripts, provide Web servers the capability to produce dynamic documents and maintain user information or state. With CGI scripts, developers can capture user entered data, access external applications to process the data, and return the results. Using CGI scripts to interface with database applications gives Web servers the ability to maintain state by tracking user data, information, and preferences. This thesis implements a Windows spreadsheet based decision support system (DSS) designed to optimize radar coverage of tactical aircraft. Using Delphi to write CGI scripts, the Web based DSS allows the user to enter data to run a new problem, save input and output data, and retrieve the saved data at a later time.

### **AN ANALYSIS OF THE U.S. NAVY GOAL-BASED RECRUITING SYSTEM**

**David A. Pry-Lieutenant Commander, Supply Corps, United States Navy**

**B.S., College Misericordia, 1983**

**Master of Science in Management-June 1996**

**Advisors: Katsuaki Terasawa, Department of Systems Management**

**Keebom Kang, Department of Systems Management**

Recruiting practices within the Department of Defense have received criticism during recent audits because of increased costs and inefficiencies. The General Accounting Office (GAO) reported many of the existing problems within the recruiting commands are caused by the goal-based recruiting systems used by the services. This thesis discusses management theories on goal-based systems and analyzes U.S. Navy recruiting data in order to identify possible explanations why individual recruiter productivity has declined since 1990 and why less than 20% of the Navy recruiting districts are achieving their assigned mission requirements.

The author presents an alternative system, which is an incentive-based system, known as Production Recruiting Incentive Model (PRIME). PRIME is a mechanism designed to maximize market potential, provide an equitable reward program, and obtain important market information in order to allow for better resource allocation decisions. PRIME is currently being prototyped by the U.S. Army recruiting command. The author recommends the Navy Recruiting Command adopt and experiment with PRIME as it is designed to allow various incentive tools to be incorporated within its framework.

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### REINVENTING MILITARY RETIREMENT

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**Master of Science in Management-December 1995**

**Advisor: Richard B. Doyle, Department of Systems Management**

The thesis examines the possibility of applying private sector retirement plan principles to the military retirement system. The increasing cost and generosity of military retirement coupled with political pressures to reduce federal spending has focused attention on reforming the military retirement system. Previous studies of the military retirement system are addressed and critiqued. Private retirement options are reviewed and a 401(k) plan is proposed to replace the current military retirement system. The new retirement system would reduce federal outlays for military retirement by 66 percent while covering all service members. The role of retirement compensation in shaping force structure and retention are addressed. The thesis concludes that privatizing military retirement is feasible and less costly than the current military retirement system while still meeting most of the objectives of military retirement compensation.

### AN ANALYSIS OF COMPONENT BREAKOUT FOR THE TUBE LAUNCHED OPTICALLY TRACTED WIRE-GUIDED MISSILE SYSTEM

**Thomas A. Ramsay-Captain, United States Army**

**B.S., Old Dominion University, 1985**

**Master of Science in Management-December 1995**

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This thesis examines and analyzes the component breakout program for the Tube Launched Optically Tracted Wire-Guided (TOW) Missile System. The advantages and disadvantages of component breakout are addressed, and an analysis of the component breakout process from the TOW Project Office perspective is provided.

The research methodology consisted of a literature review, personal and telephonic interviews, and questionnaire responses of senior military and civilian acquisition personnel.

The conclusions based on this research are: (1) Component breakout is resisted by program managers, (2) Component breakout operates in an environment of competing requirements and interests, (3) Component breakout guidance is sufficient, and (4) Component breakout is going to be increasingly difficult to accomplish in the future.

Recommendations of this study include: (1) Ensure that the component breakout strategy is included in the acquisition strategy, (2) Require a risk analysis prior to all breakout decisions, (3) Determine and fund the additional personnel resources required when performing component breakout, and (4) Conduct a cost benefit analysis prior to making a component breakout decision.

### THE IMPACT OF THE ELIMINATION OF "FACILITY NOT AVAILABLE" (FNA) WAIVERS

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**B.S., University of Maryland, 1991**

**Master of Science in Management-March 1996**

**Advisor: Richard B. Doyle, Department of Systems Management**

This thesis examines the impact of the elimination of "Facility Not Available" (FNA) waivers. Naval Reserve facilities could previously waive, as "FNA," any portion of the periodic physical examination not locally available. The Navy eliminated the authority to use FNA waivers in February 1994. The objective of this thesis was to identify the impact of FNA waiver elimination on periodic physical examination cost, effectiveness and delivery methods. It begins by describing the periodic physical examination and the Naval Reserve physical examination delivery system. Three methodologies were used to do this: interviews of key personnel, a literature review, and analysis of retrospective data from the Naval and Marine Corps Physical Evaluation Board (PEB) and the Commander of the Naval Reserve Force (CNRF). Then the impacts of FNA waiver elimination were examined using a survey which resulted in the review of 81,699 medical records and periodic physical examination delivery and cost data from 199 Naval Reserve facilities (98 per-

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cent of the Naval Reserve). This thesis found that FNA waiver elimination was an extremely successful change in health care policy for the Naval Reserve. Periodic physical examination costs were increased and the methods used to deliver examinations were changed. However, these impacts are justified because of the dramatic increase in periodic physical examination effectiveness achieved due to FNA waiver elimination.

### **ANALYSIS OF THE AIRCRAFT CARRIER ELECTRIC MOTOR REPAIR SHOP USING SIMULATION AND ANIMATION**

**Jeffrey A. Richardson-Lieutenant, United States Navy  
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**Master of Science in Operations Research-September 1996**

**Advisor: Keebom Kang, Department of Systems Management  
Second Reader: Arnold H. Buss, Department of Operations Research**

While operating within the Battle Force Intermediate Maintenance (BFIMA) Activity, emergent maintenance requests issued by ships in company with the carrier for motor rewind and overhaul work naturally occur whenever other suitable and better equipped maintenance assets such as tenders or nearby shore facilities are not available. To evaluate the capability of the carrier's electric motor repair shop to support the BFIMA, a simulation and animation model of the repair process was developed. The model computed the mean number of rewinds and overhauls and their average repair turnaround times as shop resource levels and arrival rates varied during one 6 month deployment. The analysis shows that addition of another bake oven improves readiness by significantly reducing mean repair times.

### **AN ANALYSIS OF THE EFFECTS OF INCREASES IN AVIATION BONUSES ON THE RETENTION OF NAVAL AVIATORS USING AN ANNUALIZED COST OF LEAVING (ACOL) APPROACH**

**David Riebel, Jr.-Lieutenant, United States Navy  
B.A.S., Miami University, 1988**

**Master of Science in Management-March 1996**

**Advisor: Stephen L. Mehay, Department of Systems Management**

The objective of this thesis is to develop an Annualized Cost of Leaving (ACOL) model to predict Naval aviator separation decisions in response to changes in aviation bonus pays, specifically Aviation Continuation Pay (ACP) and Aviation Career Incentive Pay (ACIP). The ACOL approach models an individual's decision to stay or leave the military based on the monetary differences between alternative career choices. The individual's "taste" or preference for military versus civilian life are incorporated into the decision modeling process. The model assumes that individuals will stay in the military if the positive difference between expected military pay and expected civilian pay (the cost-of-leaving) exceeds the distaste for the military lifestyle. Officer Master File (OMF) data from the Defense Manpower Data Center (DMDC) and data developed by Turner (NPS 1995) were used to determine individual characteristics and to compute the present value of the expected military pay stream. Census Bureau data were used to estimate future expected civilians earnings. A logit regression model was developed to simulate the retention of Naval aviators in response to changes in the ACOL due to increases in ACIP or AP. The results indicate that the proposed increases in either ACIP or ACP are cost effective ways of increasing the retention of Naval aviators.

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### AN IMPLEMENTATION OF TRACEABILITY MODELS

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**B.S., The Ohio State University, 1985**

**Master of Science in Information Technology Management-September 1996**  
**and**

**Danelle Theresa Sadoski-Lieutenant, United States Navy**

**B.A., Mount Mary College, 1984**

**Master of Science in Information Technology Management-September 1996**

**Advisors: Balasubramaniam Ramesh, Department of Systems Management**

**William J. Haga, Department of Systems Management**

The DoD is concerned with ensuring that the designed systems meet the specified requirements. Current standards governing the procurement of complex computer based systems (e.g., DoD-STD-498) state that requirements traceability must be accomplished, without providing more elaboration on what information must be captured and how it is to be used. Based on a detailed study of traceability practice in several organizations engaged in system engineering, recent research at Naval Postgraduate School (NPS) has developed several models of traceability. These models identify the components of a comprehensive traceability scheme to capture various stakeholders' views. Our research investigates how the NPS models can be used in a complex system engineering project. An example problem developed by the Naval Surface Warfare Center (NSWC) based on the 21<sup>st</sup> Century Ship was used for implementing these models. SLATE, a commercial CASE tool with sophisticated requirements traceability functionalities was used. We illustrate traceability between mission needs, system objectives, requirements, design and implementation. Requirements identification, representation of rationale and assumptions, and ad-hoc queries are also discussed. The models used were effective in capturing traceability information in this complex system engineering problem.

### EMBEDDED SOFTWARE DEVELOPMENT: A CASE ANALYSIS OF THE U.S. ARMY BRADLEY FIGHTING VEHICLE A3 PROGRAM

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**B.S.C.E., Virginia Polytechnic Institute and State University, 1985**

**Master of Science in Management-June 1996**

**Advisor: David F. Matthews, Department of Systems Management**

**Second Reader: Orin E. Marvel, Command, Control, and Communications Academic Group**

Embedded-software development is firmly established as a major cost, schedule, and performance risk in modern weapon systems programs. While embedded-software gives modern weapon systems enormous capability, the software acquisition process itself is undergoing a difficult evolution. This process is complicated by several factors: the complex demands placed upon software by modern, real-time weapon systems, the intangible nature of software, the software-as-art approach to development, and a general lack of software management expertise in many programs. The embedded-software development challenge becomes even greater when a traditional, hardware-oriented prime contractor, with no significant software experience, is selected to develop and integrate extensive software upgrades to existing weapon systems. The Bradley Fighting Vehicle A3 Upgrade (Bradley A3) Program provides valuable insight into the embedded-software product while simultaneously creating a software development process (where none existed previously) is extraordinarily difficult. When such a situation exists, program managers (PMs) must plan and schedule for the developer's learning curve. PMs must also assess their own levels of software development knowledge, educate themselves on software acquisition management, and seek assistance from sources which possess the requisite software acquisition expertise.

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### INDEXING AND RETRIEVAL IN DIGITAL LIBRARIES: DEVELOPING TAXONOMIES FOR A REPOSITORY OF DECISION TECHNOLOGIES

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**Master of Science in Information Technology Management-March 1996**

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DecisionNet is an online Internet-based repository of decision technologies. It links remote users with these technologies and provides a directory service to enable search and selection of suitable technologies. The ability to retrieve relevant objects through search mechanisms is basic to any repository's success and usability and depends on effective classification of the decision technologies. This thesis develops classification methods to enable indexing of the DecisionNet repository.

Existing taxonomies for software and other online repositories are examined. Criteria and principles for a good taxonomy are established and systematically applied to develop DecisionNet taxonomies. A database design is developed to store the taxonomies and to classify the technologies in the repository. User interface issues for navigation of a hierarchical classification system are discussed. A user interface for remote World Wide Web users is developed. This user interface is designed for browsing the taxonomy structure and creating search parameters online. Recommendations for the implementation of a repository search mechanism are given.

### AN ANALYSIS OF THE SEPARATION BONUS (VSI/SSB) PROGRAM USING THE ANNUALIZED COST OF LEAVING MODEL

**Frank Rogge-Lieutenant Commander, German Navy**

**Master of Science in Management-March 1996**

**Advisors: Stephen L. Mehay, Department of Systems Management**

**Julie A. Dougherty, Department of Systems Management**

This thesis investigates the effect of the Voluntary Separation Incentive/Special Separation Bonus (VSI/SSB) on the voluntary separation behavior of Navy officers and Navy enlisted personnel using the Annualized Cost of Leaving (ACOL) model. The thesis also estimates the effect of the threat of a reduction-in-force (RIF) on VSI/SSB program acceptance behavior. Data provided by the Defense Data Manpower Center (DMDC) on VSI/SSB eligible Navy officers and Navy and Air Force enlisted personnel in FY93 and FY92 are used for the empirical analyses. Multivariate probit models are estimated to predict the voluntary separation rate in the absence of the financial incentive. These estimates are used to calculate the costs and benefits of the VSI/SSB program for both Navy officers and Navy enlisted personnel. This thesis finds that the VSI/SSB program increased the voluntary separation rate by 44.93 percent for Navy officers, but only by 4.29 percent for Navy enlisted personnel. The threat of RIF significantly increases voluntary separation rates.

### SURVIVABILITY OF FREE INFORMATION RESOURCES ON THE WEB

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**David R. Henderson, Department of Systems Management**

Economists rightly believe that people rarely give away valuable resources. Yet a casual look at the World Wide Web suggests otherwise. This thesis shows that the economists are right: firms and organizations, even on the World Wide Web, rarely give away valuable information. Instead, the Web sites are "advertising sites". Just as "free TV" is based on paid advertising, apparently free access to Web sites is really access to advertising. This conclusion is based on a statistical analysis of 58 Web sites. The sites were chosen using the snowball relational sampling technique, whereby one Web site leads logically to others. Five percent of the sampled sites were closed during the period of study. Hypoth-

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esis testing using the variables category, product, motive, revenue base, charges, and documentation permit the conclusion that the remaining 95 percent are likely to be maintained by their hosts and sponsors. This is comforting news for DoD users of informational services on the Web. DoD users are likely to have access to such services in the future.

### **NAVAL AVIATION'S USE OF SIMULATORS IN THE OPERATIONAL TRAINING ENVIRONMENT: A COST ANALYSIS PERSPECTIVE**

**Robert S. Roof-Lieutenant, United States Navy**

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**Master of Science in Management-June 1996**

**Advisors: William R. Gates, Department of Systems Management**

**John E. Mutty, Department of Systems Management**

The basic objective of this thesis is to identify potential financial savings in operational flight training. There are seventeen communities listed in operational flight training. There are seventeen communities listed in the Commander U.S. Naval Air Forces Pacific Fleet (CNAP) and Commander U.S. Naval Air Forces Atlantic Fleet (CNAL) Squadron Training Matrices (TRM). The F/A-18, SH-60B, and the P-3C communities were chosen for this thesis as representative of a valid cross section of Naval Aviation. Each community's advanced qualifications were studied to determine the effectiveness and quality of training received in the simulator. Research data were obtained through: government publications, professional materials, previous theses, books, articles and personal interviews with cognizant personnel in Aviation Manpower & Training (N889F), Wing Training & Readiness Offices, CNAP/CNAL Readiness Officers, and Wing Simulator Officers. The flight hour cost savings from moving the identified qualifications to the simulator were compared to the additional simulator operating costs. The basic conclusion of this thesis is that there are significant financial savings from moving certain identified TRM qualifications to the simulator, with little or no degradation in training or safety. Therefore, moving these qualifications will reduce costs without significantly impacting operational readiness.

### **COST AND CUSTOMER SERVICE ISSUES IN NAVY MEDICAL LOGISTICS**

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**M.B.A., State University of Albany, 1988**

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The purpose of this research is to examine inventory management issues in today's Navy healthcare environment. The automated inventory systems and inventory processes used by Navy medical inventory managers limit their ability to control variable inventory costs and provide good customer service. This thesis examines two current approaches used by Navy medical material managers at several Navy Medical Treatment Facilities: the Medical Inventory Control System (MICS) and the Prime Vendor Program. Background and case study research obtained from the Naval Medical Center, Oakland are used for comparative analyses of these approaches with cost minimizing models and service level models. Research results indicate that although introduction of the Prime Vendor Program has been effective in addressing many of the cost and customer service problems associated with MICS, several inefficiencies will exist and explicit cost minimization is not specifically addressed with the Prime Vendor Program. It is recommended that the MICS be changed to allow Navy medical inventory managers to correct the cost and customer service inefficiencies noted in this research or that the MICS be replaced with an automated system that provides Navy medical inventory managers with the ability to optimally manage their inventories.

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### **AN EXPERIMENTAL INVESTIGATION OF THE INTERACTION BETWEEN FEEDBACK AND GOALS ON STAFF RESOURCE ALLOCATION**

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The Department of Defense Information Technology budget stands at nine billion dollars and is under severe scrutiny while the backlog of required software continues to grow. It is thereby necessary to improve the efficiency of managing the software process. This thesis uses the Systems Dynamic Model of Software Project Management to investigate the effects of stated goals and project feedback on project manager behavior. Specifically, the experiment focuses on how software project managers allocate resources in both factual and erroneous feedback environments. The effect of goals and feedback on manager performance are measured in terms of staffing level decisions, percent of staff allocated to quality assurance activities, estimated schedule, estimated programmer productivity, and estimated cost. The results show that manager performance is highly sensitive to stated goals.

### **THE U.S. MILITARY HEALTH SERVICE SYSTEM AND SOCIALIZED MEDICINE: A CONTRAST AND COMPARISON**

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**Master of Science in Management-December 1995**

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The Military Health Service System (MHSS) has experienced rising health care costs, raising the issue of whether the MHSS provides cost-effective peace time health care. One possible explanation for the rising health care costs is that the MHSS is a system of socialized medicine and that such systems do not incorporate incentives to control costs. This thesis addresses the question of cost-effectiveness of the MHSS by comparing and contrasting the MHSS with the socialized health care systems of Canada and the United Kingdom. The objective is to gain an understanding of the MHSS by identifying its similarities and differences with these other systems. Based upon the analysis, it is concluded that the problems experienced by all three systems are essentially the same. The rising costs experienced by the MHSS are rooted in the adverse economic incentives associated with socialized medicine. These incentives encourage patients, providers and administrators to act with little regard to costs. Without the benefit of a market system to convey price information, the cost of the service provided does not bear a direct relationship to the value received. The incentives inherent in the MHSS preclude beneficiaries from receiving a health care benefit that provides the most value for the costs incurred. Costs can be controlled only through a system structured to provide incentives which motivate all participants to seek cost-effective care.

### **AN EVALUATION OF THE FINANCIAL MANAGEMENT SYSTEM AT THE MILITARY SEALIFT COMMAND**

**Jeffrey A. Rutledge-Captain, United States Marine Corps**

**B.S., Lehigh University, 1989**

**Master of Science in Management-December 1995**

**Advisors: Susan Hocevar, Department of Systems Management**

**Joseph San Miguel, Department of Systems Management**

This thesis examines the Military Sealift Command's (MSC's) Financial Management Information System (FMIS) to determine whether the system will adequately support program managers under the MSC's future reinvented organizational structure. Specifically, this thesis sought to determine whether sufficient timely, accurate, and usable financial information is made available to managers to manage their respective programs. Research data was gathered primarily

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through interviews with MSC personnel, an examination of MSC's General Ledger module within the FMIS, and an examination of internal financial management reports. The analysis revealed that the General Ledger module of FMIS and the FMIS in general, will, with a few exceptions, adequately support the program managers' future financial management information requirements. Finally, recommendations for additions or improvements are discussed.

### **AN ANALYSIS OF THE ROLE OF THE JOINT CHIEFS OF STAFF IN THE REQUIREMENTS GENERATION AND RESOURCE ALLOCATION PROCESS WITHIN THE DEPARTMENT OF DEFENSE**

**Gabriel R. Salazar-Commander, United States Navy**

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**John E. Mutty, Department of Systems Management**

This thesis examines the role of the Joint Chiefs of Staff in the requirements generation and resource allocation process within the Department of Defense (DoD). The Joint Chiefs of Staff's role and particularly that of the Chairman in the Planning, Programming, and Budgeting System (PPBS) continues to evolve and has become not only more critical but more visible due to the end of the Cold War and the subsequent DoD drawdown. This thesis will identify the changes that have occurred to this process from the early years prior to 1960, through the McNamara era and the introduction of the Planning, Programming, and Budgeting System, and the changes that occurred as a result of the Goldwater-Nichols Defense Reorganization Act of 1986. The role of the Joint Chiefs of Staff will be examined in each of these periods and a detailed explanation of the current process will be given. Additionally, the role of the Chairman and of the Joint Requirements Oversight Council and their growing influence over the PPBS will be investigated. Finally, this thesis will describe the emerging Joint Warfighting Capability Assessment process and its role in resource allocation for national defense.

### **FEASIBILITY COMPARISON AND ANALYSIS OF THE UNIX NETWORK ENVIRONMENT AND THE WINDOWS NT ENVIRONMENT FOR INTEGRATION WITH THE DEFENSE INFORMATION INFRASTRUCTURE (DII)**

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**and**

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The history of the Department of Defense (DoD) information system technical infrastructure includes a collection of stovepipe, single purpose systems. Recently, the DoD has developed initiatives to help promote the development of common target architectures to which DoD information systems can migrate, evolve, and interoperate. The DoD's

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Technical Architecture Framework for Information Managers (TAFIM) provides system developers guidance and methodologies for developing standard architectures. The Defense Information Infrastructure (DII) Common Operating Environment (COE) is a development architecture based on the ideas of TAFIM, and provides a framework for designing and building military information systems.

This thesis applies the objectives presented in TAFIM in order to develop an approach for determining which network operating system (NOS) would best facilitate implementations of the DII COE. By first examining the evolution of Navy information systems, and the development of the DII COE, this thesis provides a detailed description of requirements placed on a NOS by a DoD DII COE based information system. These requirements are then used to help understand how TAFIM's objectives apply to NOSs. Two prevalent NOSs, Unix and Windows NT, are evaluated structured on TAFIM's guidance and the requirements of the DII COE. A determination is made based on these guidelines that both NOSs belong in future information systems, for appropriate tasks, based on the DII COE.

### **COMPUTER MODELING AND SIMULATION OVERVIEW FOR A NAVY LOGISTICIAN**

**Robert B. Scearce-Lieutenant, United States Navy**

**B.S., University of South Carolina, 1987**

**Master of Science in Management-June 1996**

**Advisors: Keebom Kang, Department of Systems Management**

**Donald Eaton, Department of Systems Management**

The purpose of this thesis is to examine computer modeling and simulation uses in the U.S. Navy. This thesis is intended to provide a Navy Logistician with an overview of computer modeling and simulation uses and management within the Department of the Navy. This thesis research indicates a large demand for models and simulations with joint applicability. It also indicates the need for the Navy to examine modeling and simulation management and organization to ensure economic and effective utilization. With decreasing Department of Defense budgets, the efficient management of this critical resource and capability is extremely important. The information contained in this thesis will be of value for a Navy logistian in providing knowledge about a few models and simulations and the trend towards joint applicability.

### **AN EXAMINATION OF RISK MANAGEMENT TECHNIQUES IN THE LIGHTWEIGHT 155MM HOWITZER PROGRAM**

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**Master of Science in Management-December 1995**

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This thesis examines the risk management techniques which are available for use by the Program Manager of the Lightweight 155mm Howitzer program. With the decision to replace the existing fleet of M198 155mm howitzers in both the Army and the Marine Corps, the Program Office has opted to pursue an aggressive, streamlined acquisition. A two step process of Risk Identification and Risk Assessment was conducted in order to identify the types, impacts and likelihood of schedule risks facing the program. An examination of an earlier howitzer acquisition, that of the M119 105mm howitzer, was conducted in an attempt to garner lessons learned which could be applied to this program. Finally, these lessons learned were combined with prevailing practices in business and Government risk management in an effort to provide the Program Office with a set of actions by which the risks facing the program could be avoided, controlled, assumed, or transferred. Conclusions drawn from this analysis reveal that the risk management strategy of risk control is the most appropriate and effective methodology for this program. Additionally, it was determined that proactivity and involvement on the part of the Program Management Office significantly reduces the likelihood or impact of identified risk events. Adoption of the recommend result in a decreased risk impact on the program schedule as the result of identified risk event occurrence.

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### RISK MITIGATION TECHNIQUES EMPLOYED IN THE REMEDIATION CONTRACTING PROCESS FOR THE ENVIRONMENTAL CLEANUP OF FORT ORD, CALIFORNIA

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The remediation contracting process for Hazardous, Toxic, and Radiological Wastes (HTRW) is inherently risky. The Government must mitigate cost, schedule, and performance risks that are a result of HTRW complexities. When Fort Ord, California, was designated for closure in 1991 by the Base Realignment and Closure (BRAC) Commission, the U.S. Army became responsible for the total remediation of Fort Ord's properties. The effort represents a large-scale, complex remediation project to remove both surface and sub-surface hazardous and toxic wastes. The U.S. Army Corps of Engineers (Corps), Sacramento District is in charge of Fort Ord's ultimate cleanup. The Corps is using the Total Environmental Restoration Contracts (TERC) method as the principal tool to facilitate the required remediation. This thesis identifies and analyzes the risk mitigation efforts, from acquisition planning through contract administration, employed by the Corps in its contracting efforts. The objective of this thesis is to identify the unique risk mitigation strengths and weaknesses of the Corps' efforts and to recommend future risk mitigation efforts for large-scale HTRW remediation efforts.

### THE USE OF COMMERCIAL STANDARDS IN PLACE OF MILITARY STANDARDS IN ARMY NDI ACQUISITIONS-M915 TRUCKS

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**Master of Science in Management-December 1995**

**Advisor: Dan C. Boger, Department of Systems Management**

This paper examines the United States Army's use of commercial standards in place of military standards (MIL-STDs) for the acquisition of Non Developmental Items (NDI). The recent acquisition of M915 series trucks is examined. The use of commercial quality standards in place of military quality standards is discussed. In addition, the future commercial quality standard, the ISO 9000 family of standards, is looked at.

The paper begins with a discussion of current and future commercial quality standards. Then the MIL-STDs used and the MIL-STDs replaced by commercial standards in the acquisition of M915 series trucks are discussed. Benefits and concerns arising from the use of commercial standards are followed by the final chapter which contains the paper's conclusion that the use of commercial standards for Army NDI acquisitions makes sense, and recommends that the Army move toward mandating the ISO 9000 commercial standards.

### FUTURE INTELLIGENCE DISSEMINATION ARCHITECTURE

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**Master of Science in Systems Technology-June 1996**

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**Carl R. Jones, Department of Systems Management**

Joint task force commanders rely on intelligence to provide insight into an uncertain world. To fill this need, there are several Department of Defense (DoD) mechanisms to gather and display a wide variety of information. For Signals Intelligence (SIGINT) dissemination there are three primary systems: the TRAP Data Dissemination System (TDDS) operated by the Navy, the Tactical Information Broadcast Service (TIBS) operated by the Air Force, and the Tactical Reconnaissance Intelligence Exchange System (TRIXS) operated by the Army. In the Intelligence Authorization Act for Fiscal Year 1996, the House Select Committee on Intelligence threatened to freeze 75% of the DoD's intelligence

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budget until a comprehensive plan to unify intelligence broadcasts was completed. In response the Integrated Broadcast Service (IBS) plan was published by the Office of the Assistant Secretary of Defense for C3I. This thesis addresses the proposed IBS migration plan, the challenges ahead for the IBS program, the requirements for an ideal intelligence dissemination architecture, provides an assessment of the IBS with respect to the ideal system and makes recommendations for future intelligence dissemination. Two appendices are included: an example of the use of optical links in space-based information networks and a catalog of the satellite constellations operated by the National Reconnaissance Office (NRO). This thesis concludes that all intelligence dissemination should be carried on a global dissemination network for complete support to the warfighter.

### **IMPROVEMENTS IN SHIP REFIT STRATEGIES AND PROCEDURES:**

#### **THE CASE OF THE ROYAL MALAYSIAN NAVY**

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Effective refit procedures and strategies is an important element in ensuring the high operational availability of ships. The Royal Malaysian Navy refit procedures and strategies, which are based on the Royal Navy's procedures, are currently facing increasing drawbacks and the delay of ships in refit often goes beyond the acceptable period of thirty days. The factors which contributed to the delays are numerous and has cost the Malaysian Government considerable. With the reduction in the defense budget, accurate and economically sound procedures, strategies and decision-making are most essential.

To improve the procedures and strategies, this thesis evaluates the current Royal Malaysian Navy procedures and its drawbacks and subsequently outlines the U.S. Navy's availability process for comparison. Finally, this thesis draws conclusions based on the comparison of the procedures and supporting tools. These findings offer immediate and medium-term actions and indicates further research that should be addressed in order to improve the current refit procedures and strategies for the Royal Malaysian Navy.

### **REENGINEERING OF THE F/A-18 AIRCRAFT'S**

#### **INTERMEDIATE LEVEL HYDRAULIC MAINTENANCE**

**Curt M. Shanahan-Lieutenant Commander, United States Navy**

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**Donald Eaton, Department of Systems Management**

The continued down-sizing of the Department of Defense (DoD) into the 21<sup>st</sup> Century and the resulting budget constrained realities will force the Navy to adopt innovative measures to save costs, while not sacrificing readiness. The Navy's immediate future in aviation lies in the readiness of the F/A-18 Hornet aircraft weapons system. Present experience shows the F/A-18's hydraulic system is not performing effectively and subsequently is one of the top readiness degraders. In this thesis, we analyze reengineering and consolidating duplicate intermediate level F/A-18 hydraulic system maintenance capabilities. Consolidating the maintenance of duplicate capabilities into one facility per coast, as we propose for the intermediate maintenance facilities for these hydraulic components, would reduce cost while maintaining readiness. We develop a comparative spreadsheet model to analyze a Prime Intermediate Maintenance Activity (PIMA) operating as a consolidated facility to investigate the effects of consolidating production and its impact on readiness. Based on our analysis, we conclude that the proposed consolidation is a viable option.

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### THE FUTURE OF THE SWEDISH DEFENSE INDUSTRY: STRATEGIES FOR COMPETITIVENESS AND SUPPORT

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Master of Science in Management-December 1995

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In light of the new geopolitical developments and the end of the Cold War, the Swedish government is downsizing the Armed Forces. The proposed organization and spending level will not be able to sustain a domestic defense industry of current size. In attempt to overcome this, there are different industry initiated strategies available. This thesis evaluates three of them: International Cooperation, Concentration and Consolidation, Integration and/or Conversion, by using evaluation criteria derived from the future needs of the Swedish Armed Forces. The criteria are: Produce competitive systems, Maintain a broad defense industrial base for growth, Support buildup and mobilization, Provide technology unavailable from abroad, Support and modify systems in inventory and Limit foreign dependence. The evaluation shows no single strategy that fulfills all needs. International cooperation is the strategy that best meets the needs. The Swedish Defense Industry must choose its own strategy to adapt to the new environment. It may include elements of all three strategies, but given foreseeable spending levels, it is impossible to pursue all three simultaneously. It is therefore necessary for the government and the Armed Forces to clearly communicate future priorities requirement in order to facilitate the process.

### ECONOMIC GROWTH IN SOUTH KOREA: GOVERNMENT OR FREE MARKET ACHIEVEMENT?

Antonio Carlos Stangerlin Rebelo-Lieutenant Colonel, Brazilian Air Force

B.S., Brazilian Air Force Academy, December 1978

Master of Science in Management-December 1995

Advisor: David R. Henderson, Department of Systems Management

This thesis is an attempt to access how good has been the South Korean economic performance since the end of the Korean War and how interventionist the government has been, and to decide what has been responsible for the economic growth, the government or the free market. The main indicators of the Korean performance and the roles of the government and of the free market on the economy are discussed. A regression is run relating the GDP growth rate to the degree of trade liberalization and government spending.

The findings can be summarized as follows: 1) The Korean performance has been outstanding, 2) the government and free market's roles and their contributions to the economic growth have varied in different periods in the Korean economy: A) First was the period from the end of the Korean War until the military coup of 1961, with government highly interventionist, the free market repressed, and poor results, B) Second was the period from 1961 until 1980, characterized by an interplay between the government and the free market leading to a high economic growth, and C) Third was the period from 1980 to the present, the liberalization period, with market forces being the main source of the high economic growth, and 3) The economy has been negatively affected by government spending and trade restrictions.

### ON-THE-JOB TRAINING FOR CONTRACT SPECIALISTS (GS-1102) AT FLEET AND INDUSTRIAL SUPPLY CENTER (FISC) DETACHMENT WASHINGTON

Patrick John Stansfield-Lieutenant Commander, United States Navy

B.S., B.A., University of Missouri at Columbia, 1981

Master of Science in Management-December 1995

Advisor: David V. Lamm, Department of Systems Management

This thesis focused on the training requirements of GS-1102 Contract Specialists. In June 1995, a survey was taken of thirty-five contract specialists and ten supervisors at the Fleet and Industrial Supply Center, Norfolk, Washington

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Detachment. An analysis of the responses was conducted in an effort to develop a training and qualification plan for this command. Principal findings include: there is a significant lack of time dedicated to training and OJT, the training needs of junior interns are different from those of more senior contract specialists, and timing of DAWIA courses are an important aspect of the intern program. Recommendations are: supervisors should conduct training in a way that allows for production and training to go on concurrently, the establishment of a Training Requirements Review Board to oversee the training at the command, training should be conducted with people of similar experience levels and in small groups, the Federal Acquisition Institute's Contract Specialists Blueprints are a useful starting point for development of training lessons, a case approach is a good vehicle for delivering training in this setting.

### **DETERMINING AN OPTIMAL BULK-CARGO SCHEDULE TO SATISFY GLOBAL U.S. MILITARY FUEL REQUIREMENTS**

**Jason T. Strength-Lieutenant, United States Navy**

**B.S., Georgia Institute of Technology, 1990**

**Master of Science in Operations Research-September 1996**

**and**

**Jorge E. Quiroga-Lieutenant, United States Navy**

**B.S., San Jose State University, 1988**

**Master of Science in Operations Research-September 1996**

**Advisor: Dan Boger, Department of Systems Management**

**Second Reader: Bob Vassian, Department of Operations Research**

The Defense Fuel Supply Center (DFSC) is responsible for the acquisition, storage, and distribution of bulk petroleum products to support worldwide military service requirements. DFSC delivers these fuel products around the globe through a fleet of bulk-cargo tankers which are controlled by Military Sealift Command (MSC). The current method of scheduling cargo deliveries is done manually and takes approximately three to five days to complete, requiring close interaction with MSC. The cargo scheduling planners must specify a feasible load port and time, and discharge port and time for each cargo such that military fuel demands are met and the tankers are utilized efficiently. Currently, there are no mathematical models available to assist scheduling planners in assigning an efficient cargo schedule

The objective of this thesis is to aid scheduling planners in determining the most efficient cargo sequencing plan. This is achieved through the development of a mathematical model which represents the cargo scheduling problem, and the design of a microcomputer interface that allows use of the model as a management tool which seeks to maximize the number of cargo deliveries. Specifically, an optimization model utilizing the network structure of the maximum flow model, which is accessed through a spreadsheet-based interface, is used to solve the cargo scheduling problem.

### **DEVELOPMENT OF A GRAPHICAL USER INTERFACE FOR REMAP**

**Jon Richard Stueve-Lieutenant, United States Navy**

**B.S., Oregon State University, 1990**

**Master of Science in Information Technology Management-September 1996**

**Advisor: Balasubramaniam Ramesh, Department of Systems Management**

**Second Reader: William Haga, Department of Systems Management**

A consistent and simple graphical user-interface (GUI) is an important factor contributing to the success of interactive systems. Developing such a GUI for complex applications is an important aspect of software development within DoD. This thesis investigates the complexities of developing a GUI using high-level, object-oriented frameworks. A usability study identified several problems with the user interface of REMAP, a system for capturing design rationale in a formal systems development environment. Based on the recommendations from this study, several improvements were made to the GUI of REMAP. These include changes to the layout to provide an enlarged graphical area, development of context sensitive pop-up menus, a simplified set of controls, keyboard shortcuts for frequently used commands and a more detailed information window. Implementation strategies to achieve the desired functionality are the use of high

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level object oriented frameworks, use of design patterns, simplification of object hierarchies, and improved pointer functionality. Detailed examples on the use of these strategies are provided with software code and screen images from the application.

### **A COMPUTER NETWORK SIMULATION TUTORIAL FOR COMNET III**

**Jeffrey Edward Sullivan-Lieutenant, United States Navy**

**B.S., University of Missouri - Rolla, December 1988**

**Master of Science in System Technology-June 1996**

**Advisors: Suresh Sridhar, Department of Systems Management**

**Dan Boger, Command, Control, and Communications Academic Group**

The military is heavily reliant on the transfer of information among various networks in its day-to-day operations. With fewer defense dollars available for the development of new systems, the use of commercial-off-the-shelf (COTS) hardware to build military information networks is becoming commonplace. The critical nature of much of this information requires that knowledge of the performance characteristics of the networks through which this information travels be known. These characteristics allow network managers and designers to plan for future growth of the network, analyze network reliability, and plan for the construction of new networks.

One method to determine the performance characteristics of a network is through the use of modeling and simulation. COMNET III release 1.1n is a COTS network simulation application which may be used to model and simulate both local and wide area networks. This thesis provides a tutorial to explain the theory used in the application for the modeling and simulation of networks. Each chapter presents the theory of several objects which may be used in the application, states a network problem which is to be analyzed, provides step-by-step instructions to build a model to analyze the network problem, and presents the results of the network simulation.

### **ENHANCED FIBER OPTIC GUIDED MISSILE: A CASE ANALYSIS OF FORCE STRUCTURE ISSUES EFFECTING THE PROGRAM**

**Douglas A. Tamilio-Major, United States Army**

**B.S., Salem State College, 1985**

**Master of Science in Management-June 1996**

**Advisor: John Dillard, Department of Systems Management**

**Second Reader: Orin E. Marvel, Command, Control, and Communications Academic Group**

Force structure issues are common in the acquisition of new technologies. In some cases, such as the Enhanced Fiber Optic Guided Missile (EFOG-M), it has been a painstaking effort to come to any consensus on how this system should be used and what force structure should support it. The introduction of fiber optic technology to the modern battlefield promises to revolutionize current doctrine and address a new dimension of battle. Fiber optic technology may give tomorrow's military the ability to direct precision fires against non-line of sight (NLOS) targets. This thesis examines the force structure issues effecting the Enhanced Fiber Optic Guided Missile (EFOG-M) program. The major focus is to determine if the current proposed force structure is the optimal solution and if not, suggest possible alternative solutions. Two courses of action were examined, both advocated deploying the EFOG-M system in platoon organizations organic to the battalion. An analysis of the current threat, previous studies, and concepts promulgated by Force XXI have enabled this study to recommend that the Army consider changing its current plan of deploying the EFOG-M at brigade level and field the system at battalion level.

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### **CIVIL TILTROTOR (CTR) APPLICATIONS: A DEPENDENCE ON DEFENSE DEVELOPMENT AND PROCUREMENT OF THE MV-22 OSPREY**

**William E. Taylor-Major, United States Marine Corps**

**B.S., Rutgers University, 1979**

**Master of Science in Management-March 1996**

**Advisor: Martin J. McCaffrey, Department of Systems Management**

Tiltrotor technology has been proven mature and technically feasible through well over 40 years of Government research and development, and three generations of tiltrotor aircraft. The Defense Department is moving forward with development of the MV-22 Osprey and should reach a full rate production decision in the near future. Despite a lucrative market for civil applications of tiltrotor technology, as of 1996, there has been no firm commitment to develop an civil tiltrotor (CTR). The purpose of this thesis was to examine whether Defense development and procurement of the MV-22 Osprey is a prerequisite to commercial development of a tiltrotor. This thesis focused on the barriers to introducing the CTR, and how Government efforts and the MV-22 have been influential in overcoming those barriers. There are two principal findings. First, tiltrotor technology has progressed to the point where CTR applications are dependent on the MV-22, only to the extent that without the benefit of MV-22 production, demonstration, and operational experience, the CTR's arrival will be significantly delayed. Second, technology is not the most critical consideration. The most critical barrier to successful fielding of a CTR, is a systems integration problem, primarily centered around the lack of a supporting infrastructure.

### **FUNDAMENTAL APPLIED SKILLS TRAINING (FAST) PROGRAM MEASURES OF EFFECTIVENESS**

**Cynthia Ann Thomlison-Lieutenant Commander, United States Navy**

**B.S., Jacksonville University, 1984**

**Master of Science in Management-March 1996**

**Advisors: Alice Crawford, Department of Systems Management**

**Mark J. Eitelberg, Department of Systems Management**

This thesis attempts to measure the effectiveness of Fundamental Applied Skills Training (FAST), a program designed to help selected Navy recruits succeed in Basic Military Training (BMT) by improving their literacy skills. The study first analyzes whether completion of FAST is related to the subsequent completion of BMT for recruits who entered the Navy in the Fiscal Years 1992 and 1993. FAST participants and other recruits with relatively low literacy skills from these two recruit cohorts are then compared on the basis of additional success indicators: completion of the first term of service and advancement toward higher rank (E-4). Study results suggest that participation in FAST is related to an increased probability of completing BMT and generally higher success chances in the Navy during the first term of service. Limitations in the data are addressed along with recommendations for further study.

### **INFORMATION WARFARE: IMPLICATIONS FOR FORGING THE TOOLS**

**Roger Dean Thrasher-Captain, United States Air Force**

**B.S., United States Air Force Academy, 1986**

**Master of Science in Systems Technology (C3 Systems)-June 1996**

**Advisors: Dan C. Boger, Command, Control, and Communications Academic Group**

**Carl R. Jones, Department of Systems Management**

One part of the modern Revolution in Military Affairs (RMA) is the possibility of a new form of warfare—often called information warfare. Development of information warfare depends on technological advances, systems development and adaptation of operational approaches and organizational structures. This thesis assesses the implications of information warfare for the technology and systems development areas, with the underlying motivation of ensuring the military is postured to “win the information warfare RMA” through effective research, development and acquisition. This assessment takes place primarily through a “Delphi” process designed to generate discussion between selected

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information warfare experts about the impacts of information warfare. This thesis concludes that information warfare is largely dependent on commercial information technology. This dependence means the military should rely on the commercial sector for most technological advances and products—with government research funds focused on military-unique research areas. Use of commercial items, coupled with DoD standard architectures, may enable a decentralization of information warfare acquisition to the user level. Finally, this dependence means the acquisition system should focus on architecture development, technology insertion, systems integration and on managing functions and services of systems—primarily through development of operational software to run on mostly commercial hardware.

### **INTERNETWORKING: ECONOMICAL STORAGE AND RETRIEVAL OF DIGITAL AUDIO AND VIDEO FOR DISTANCE LEARNING**

**Michael E. Tiddy-Captain, United States Marine Corps**  
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**Master of Science in Information Technology Management-September 1996**

**Advisors: Don Brutzman, Undersea Warfare Academic Group**  
**Hemant K. Bhargava, Department of Systems Management**

Previous research has shown that it is possible to use the Internet's Multicast Backbone (MBone) and associated audio/video software for the purpose of Distance Learning. As more education is performed online, the need arises to be able to view the content at the user's convenience. Through experimental testing, this thesis investigates the usefulness and feasibility of applying networked recording and storage of digitized audio and video, all via the MBone for distance learning.

Large, distributed organizations such as the Naval Service can economically benefit from use of the MBone and its associated tools. To date, Navy and Marine Corps projects using video teleconferencing have not exploited the vast possibilities provided by the Internet and the MBone. This thesis takes distance learning one step farther and combines MBone audio/video with the new recording tool called the Multicast Backbone Video Conference Recorder (MBone VCR). This enables distance learning as a viable replacement to on-site training. It is technically feasible and economically supportable to record the digital media that results from an MBone session used for a distance learning program. That stored information can then be used repeatedly and easily updated to support changing curricula and information. Problems and network-accessible solutions are demonstrated in this case study on use of the MBone VCR as a usable remote educational tool.

### **ADAPTIVE INFORMATION SYSTEMS: PORTALS TO EMPLOYMENT, TARGETING THE PHYSICALLY AND MENTALLY CHALLENGED**

**Bruce A. Tompkins-Lieutenant Commander, United States Navy**  
**B.S., University of South Carolina, 1982**

**Master of Science in Information Technology Management-September 1996**

**Advisors: Rex Buddenberg, Department of Systems Management**  
**Steven Lamar, Institute for Defense Education and Analysis**

This thesis assesses and provides a critical evaluation of reasonable accommodations in the telecommunications and information systems technologies for people with disabilities at the Naval Postgraduate School. The Americans with Disabilities Act of 1990 established a clear and comprehensive prohibition of discrimination on the basis of disability. As barriers to access are removed, more people with disabilities are taking their rightful places as contributing members of society.

This research has provided an assessment of the Naval Postgraduate School's compliance with the spirit of the Americans with Disabilities Act in providing reasonable accommodations. Areas where information systems and telecommunications products and services are not fully accessible by faculty, staff, or student with a disability were identified.

This research provided recommendations to assist NPS faculty, staff, and managers of Automated Information Systems provide Assistive Technologies Support Services and Devices. Outside resources were identified that can assist the Naval Postgraduate School by providing the expertise, education, and training on the issues dealing with

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reasonable accommodations in the workplace. The lessons learned are applicable to all Department of Defense activities.

### MEASURING TRAINING READINESS IN THE UNITED STATES MARINE CORPS

**William A. Tootle-Captain, United States Marine Corps**

**B.S., Hampton University, 1990**

**Master of Science in Management-December 1995**

**Advisors: Dan Dolk, Department of Systems Management**

**Julie Dougherty, Department of Systems Management**

Ideally, indicators of readiness should tell decision makers what operations forces are capable of, not just what resources the forces currently possess. Currently SORTS is the prime measure of readiness used throughout DoD but it only provides a snapshot in time of information about inputs (resources) and neglects the outputs (operational capability). Five indicators of readiness that do take into account the operational capability of a unit are proposed as a new suite of readiness indicators, based on input from Marine Corps commanders. The requirements to implement the proposed suite of training readiness indicators are identified and a framework for determining their true relevance to measuring readiness is presented.

### THE NATIONAL INTEREST, PRODUCTION, AND TRADE IN EL SALVADOR

**Edgard F. Tovar-Major, Salvadoran Army**

**B.S. Chilean Military Polytechnic Academy, 1981**

**Master of Science in International Resource Planning and Management-June 1996**

**Advisors: Robert E. Looney, Department of National Security Affairs**

**William Gates, Department of Systems Management**

The objective of this thesis is to develop an analysis of El Salvador's economy using available statistical data.

First, an examination is made of El Salvador's democratization process in a historical perspective. Second, an analysis is undertaken of the country's policy through historical budget allocations. Third, an assessment is made of the economic standing point of El Salvador. This discussion embraces the production sectors, to determine their strengths and weaknesses from the resources efficiency point of view. Fourth, the study analyses the implications of El Salvador's increasing trade deficit from the efficiency and equity perspectives. Fifth, a presentation is made of the economic strengths, weaknesses, threats and opportunities of the country from the short and long run perspective.

Finally, conclusions are drawn and recommendations made which could be utilized to improve El Salvador's economic future.

### ASSESSING THE PROGRAM HEALTH AND CUSTOMER SATISFACTION OF A PROJECT MANAGEMENT OFFICE: AN AUTOMATED SOLUTION

**David M. Treshansky-Captain, United States Army**

**B.B.A., North Georgia College, 1985**

**Master of Science in Management-December 1995**

**Advisors: Bard K. Mansager, Department of Mathematics**

**Nancy C. Roberts, Department of Systems Management**

Efficiency in the acquisition of major defense systems is of paramount importance, given today's environment of declining resources. To achieve this efficiency, the project office, as the responsible agency for such acquisitions, must perform its designated functions both efficiently and effectively. The two most important indicators reflecting the efficiency and effectiveness of the project office are program health and customer satisfaction. The objective of this research was to develop an automated self-assessment instrument for use by the military project manager to measure the program health and customer satisfaction of his/her organization. This thesis provides the project manager with a

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viable model depicting the critical organizational design factors impacting the program health and internal customer satisfaction of the military project office. This study also provides the project manager a pilot implementing instrument with which to assess the program health and internal customer satisfaction of his/her organization. Finally, this research effort has produced an independent software application, specifically designed to automate the self-assessment process within a military project management office.

### **CONTRACTING PRACTICES FOR MAJOR WEAPONS SYSTEMS**

#### **IN THE CHILEAN NAVY: A CASE ANALYSIS**

**Eduardo Troncoso-Commander, Chilean Navy**

**Engineering Degree, Naval Engineering School, Chile, 1982**

**Master of Science in Management-December 1995**

**Advisor: Thomas Hoivik, Department of Systems Management**

The purpose of this thesis is to analyze the contracting practices for major weapon systems procurement in the Chilean Navy. The case analysis method, with emphasis in risk assessment and management, has been used to analyze the procurement of a ship missile system, referred to in this thesis as the "Kilo Missile System". The organizational structure, rules, regulations and authority chains are also analyzed using the Agency theory, the Information Processing model, and the Interpretivist model. Procurement practices used currently by the U.S. Department of Defense and private firms are used as a point of comparison for the case analysis. The analysis shows that the project involved a high risk, which was not realized by the Project Team. However, the competency and commitment of the Project Managers, the good relationship with the contractor, and the commitment of the Project Managers, the good relationship with the contractor, and the commitment of the latter with its national Navy allowed a favorable outcome. The thesis also provides a set of lessons learned and recommendations in the areas of organization, education and Project Management for improvement of future weapon acquisitions.

### **ANALYSIS OF NETWORK TRAFFIC AND BANDWIDTH CAPACITY: LOAD BALANCING AND RIGHTSIZING OF WIDE AREA NETWORK LINKS**

**Kevin L. Trovini-Lieutenant, United States Navy**

**B.S., Park College, 1989**

**Master of Science in Information Technology Management-September 1996**

**Advisors: Suresh Sridhar, Department of Systems Management**

**Rex Buddenberg, Department of Systems Management**

The purpose of this thesis is to provide a process model to assist organizations in analyzing their Wide Area Network communication lines. The Naval Medical Information Management Center (NMIMC), in Bethesda, Maryland, is used as the model site, due to its imminent deployment of World Wide Web (WWW) servers to Navy Medical Treatment Facilities (MTF's). To model the typical MTF, an analysis of the data traffic transmitted from the existing WAN links managed and monitored by NMIMC will be performed. These WAN links are critical for the delivery of health care related information transmitted between MTF's. The WAN links must be analyzed to ensure that adequate bandwidth is available to allow unobstructed traffic flow between destinations. The data traffic will be plotted to illustrate problematic conditions caused by high utilization rates. Corrective actions will be recommended that should help to reduce or eliminate the bottlenecks and increase operational availability. The hypothesis is that the WWW servers should be installed after the WAN links are analyzed and either balanced or properly sized. The load balancing and rightsizing of the WAN links will ensure that adequate bandwidth is available for the proper and timely transmission and access of vital WWW server information.

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### AN ANALYSIS OF PROMOTION TO 0-4 IN THE 1983 COHORT

**Li-Wei Tu-Major, Army of the Republic of China**

**B.S., National Defense Management College, 1986**

**Master of Science in Management-March 1996**

**Advisors: Natalie J. Webb, Defense Resources Management Institute**

**Mike Cook, Department of Systems Management**

This thesis uses data from the 1983 cohort file merged with a college file obtained from the Defense Manpower Data Center (DMDC). This analysis focuses on the promotion rates of graduates of historically black colleges and universities (HBCUs). I estimate a model of promotion to LCDR 0-4 using a Maximum Likelihood Estimation (logistic) technique. I report the results using the "notional-person" approach; reporting the marginal effect of changes in the explanatory variables on promotion to LCDR.

Results of the study include: female promotion rates are higher than those of males, promotion rates are higher for graduates of aviation officer training programs than for graduates of military academies or ROTC programs, and finally, promotion rates for officers who graduated from HBCUs are not significantly different than promotion rates for other officers.

### ACTIVITY-BASED COSTING IN THE SYSTEMS MANAGEMENT DEPARTMENT

**Robert Kevin Tufts-Lieutenant Commander, Supply Corps, United States Navy**

**B.A., Seattle University, 1984**

**Master of Science in Management-December 1995**

**Advisors: Kenneth J. Euske, Department of Systems Management**

**Louis G. Kalmar, Department of Systems Management**

This thesis develops a computerized activity-based costing model for the Systems Management Department at the Naval Postgraduate School. The purpose of the activity-based costing model is to provide school and Systems Management Department managers a more useful means of evaluating the cost effectiveness of the Systems Management Department's various programs and activities. Three System Management Department outputs, and the activities and processes required to produce these outputs were identified, analyzed, and documented in the computer model. The activities identified were: classroom education, thesis advising, and reimbursable projects.

### A COMPARATIVE ANALYSIS OF ARMED FORCES AND PRIVATE SECTOR TUITION ASSISTANCE PROGRAMS

**Carl R. Turner-Lieutenant Commander, United States Navy**

**B.S., University of Utah, 1980**

**Master of Science in Management-June 1995**

**Advisors: James Fremgen, Department of Systems Management**

**William Gates, Department of Systems Management**

This thesis compares Navy's Tuition Assistance (TA) program with those of the other services and private corporations and identifies some significant differences. It examines each organization's policy guidelines regarding benefit levels, courses and programs funded, restrictions and obligations, and requirements for individuals and institutions to be eligible for reimbursement.

Usage rates and costs of the Navy, Marine Corps, Army and Air Force TA programs were compared. Data from FY1991 to FY1994 on voluntary education (VOLED) and TA funding levels, TA usage rates by numbers of individuals enrolled and enrollments, number of enrollments in each area of the program (high school, undergraduate, graduate, etc.), and cost per enrollment are presented.

Tuition rates and trends for community colleges and four-year public and private institutions in areas of high concentrations of Navy personnel are noted. Changes to bring benefits in line with current tuition rates in the most cost effective manner are recommended.

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Internal controls to prevent waste, fraud and abuse were identified. The Navy's centrally managed program provides excellent controls and is probably the most effective and efficient of all the services' programs.

### USING GENETIC PROGRAMMING AND STATISTICAL DATA ANALYSIS APPLICATIONS FOR KNOWLEDGE DISCOVERY IN MANPOWER DATABASES

**Danny E. Turner-Lieutenant, United States Navy**  
**B.A., The University of Florida, 1990**

**Master of Science in Information Technology Management-September 1996**  
**Advisors: Balasubramaniam Ramesh, Department of Systems Management**  
**Tung X. Bui, Department of Systems Management**

The Department of Defense (DoD) has significant interest in understanding the factors that contribute to the retention and attrition of its members. Statistical analyses of manpower and personnel data are conducted to predict the likelihood of members remaining in the service to complete their obligations or the likelihood of their separating early. Such quantitative studies can be complemented by approaches to discover potentially useful qualitative information to support decision/policy making.

Research in knowledge discovery or data mining has demonstrated the effectiveness of Artificial Intelligence (AI) techniques in eliciting such qualitative information through recognition of patterns or inference of "business rules" from data. Such knowledge discovery techniques may provide DoD with previously unobtained insights in the selection, management, and retention of its military personnel. Genetic programs, which are based on Darwinian evolutionary theory, can be used for knowledge discovery.

This thesis uses genetic programming and statistical data analysis applications for knowledge discovery in a DoD manpower database. This endeavor primarily focuses on evaluating the validity, redundancy, and significance of knowledge discovered.

### CONGRESSIONAL BUDGET REFORM AND THE 103RD CONGRESS

**Andrew J. Turnley-Lieutenant Commander, United States Naval Reserve**  
**B.S., University of Utah, 1982**

**Master of Science in Management-December 1995**  
**Advisor: Richard B. Doyle, Department of Systems Management**

Only three times during this century has the United States Congress undergone a bipartisan, bicameral review of its internal operations. Those three reviews were conducted in 1946, 1970 and most recently in 1992. The 102nd Congress enacted legislation in 1992 establishing a Joint Committee on the Organization of Congress. Many factors indicated that the time was right to focus specifically on budget reforms, including major budget reforms. This study focused specifically on budget reform issues addressed by the 103<sup>rd</sup> Congress.

The three primary factors associated with successful reform—were present, suggesting that reform would be successful. The failure of the 103rd Congress to enact significant budget reform legislation can be attributed to the disintegration of those three factors during the Joint Committee's existence in 1993.

### STREAMLINING THE CONTRACT CLOSEOUT PROCESS

**James Valovcin-Lieutenant Commander, United States Navy**  
**B.S., Fairfield University, 1980**

**Master of Science in Management-December 1995**  
**Advisor: David V. Lamm, Department of Systems Management**

The primary purpose of this thesis is to review the management of the contract closeout process (primarily within the Defense Contract Management Command and selective Department of the Navy contracting activities) and determine if it is performed in an effective and efficient manner. The frequency of occurrence and level of difficulty of the fifteen

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contract closeout steps listed in the Federal Acquisition Regulation (FAR) were assessed and analyzed. Secondary objectives include identifying the areas that impede the process and/or are neglected throughout the process and the ramifications thereof. Finally, recommendations are presented for a "streamlined" approach to the contract closeout process that can be applied throughout the entire contract administration cycle.

### **EFFECTS OF THE WAR ON DRUGS ON OFFICIAL CORRUPTION IN COLOMBIA**

**Hernando Wills Velez-Lieutenant Commander, Colombian Navy**

**Master of Science in Management-December 1995**

**Advisors: David Henderson, Department of Systems Management**

**Roger Evered, Department of Systems Management**

This thesis analyzes the relationship between the war on drugs and official corruption in Colombia. Two variables are used in the study. The first one is official corruption in Colombia, which is measured using the number of articles on official corruption published by Colombia's newspaper *El Tiempo* and *The Economist* magazine. The second variable is action against illegal drugs. This variable is measured by a combination of the Colombian National Police budget and the level of commitment to act against the problem.

To understand what war on drugs is, a chapter describing drug policies of both the United States and Colombia is included. On policy issues, each country has its own perspective of the problem. While the United States believes that the main problem is on the supply side, Colombian people and officials think that the problem is more demand oriented.

Results show that official corruption in Colombia is linearly correlated with action against illegal drug trafficking. If the level of action against illegal drugs increases, official corruption increases but not in the same proportion. Regression analysis revealed that 28.2 percent of the variation on official corruption is explained by variation in the action against illegal drugs. The analysis also led to the conclusion that the Colombian government is acting against the problem, and that drug-related corruption is not the only kind of official corruption in the country. Recommendations for further research are included.

### **SURVEY OF BLACK OFFICERS IN THE MARINE CORPS: ATTITUDES AND OPINIONS ON RECRUITING, RETENTION, AND DIVERSITY**

**Joseph F. Wade-Captain, United States Marine Corps**

**B.S., United States Naval Academy, 1989**

**Master of Science in Management-December 1995**

**Advisors: Alice Crawford, Department of Systems Management**

**Mark Eitelberg, Department of Systems Management**

**Gail Fann-Thomas, Department of Systems Management**

This thesis addresses the reasons why Black officers joined the Marine Corps, their attitudes toward continued service, and their general feelings about population diversity in the military. Focused interviews were conducted with 15 Black Marine officers. All interviews were taped and then transcribed. Analysis of the transcripts revealed 15 general themes. These themes covered many topics, including the people who most influenced an officer's decision to join the Marine Corps, the role of recruiters, perceptions of inequitable treatment, and concerns about achieving minority representation in the officer ranks. A major finding drawn from the themes is that the Marine Corps must continue to strive for a deeper understanding of the problems and issues confronting minority officers. In the end, the key to success in minority officer recruitment lies in the thoughts and perspectives of current, as well as, future minority officers. The thesis concludes with a collection of potential survey items drawn from the themes and recommended courses of action that may help the sea Services pursue their goal of population diversity.

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### **DEPARTMENT OF DEFENSE MILITARY ALLOWANCES ENTITLEMENT: A CRITICAL REVIEW OF THE DETERMINATION PROCESSES FOR HOUSING ALLOWANCES**

**Roger Craig Walker-Captain, United States Marine Corps**

**B.B.A., Savannah State College, 1985**

**Master of Science in Management-December 1995**

**Advisor: James M. Fremgen, Department of Systems Management**

This thesis addresses the multifaceted and potentially confusing process that DoD financial managers use when determining a service member's entitlement to one or more of three specific types of housing allowances—Basic Allowance for Quarters (BAQ), Variable Housing Allowance (VHA), and Overseas Housing Allowance (OHA). It has two objectives. The first is to simplify the determination process by consolidating rules that always lead to the same entitlement, without changing the amount to which any member is entitled. This objective is achieved by reducing the number of specific rules by nearly 70 percent through consolidation, with no changes in costs to the government or benefits to members. The second objective is to investigate the feasibility of combining the three types of allowances into a single entitlement based only on the member's status as single, married, or divorced or separated. Such a combination, with no change in the amounts to which any member is entitled, would not simplify the process in any significant way. Combinations of allowances that would simplify the process would necessarily increase amounts paid to some members and decrease amounts paid to others—in some cases, very substantially. The net cost to the government might increase or decrease, depending on the particular combined amounts chosen.

### **A COMPARISON OF AIRCRAFT DEPOT INDUCTION PROCESSES: ASPA AND PDM**

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**B.S., United States Naval Academy, 1986**

**Master of Science in Operations Research-September 1996**

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The purpose of this thesis is to compare two predominant decision processes for aircraft depot inductions. The first process, Aircraft Service Period Adjustment (ASPA), is currently applied to the majority of Naval aircraft. The decision to induct an aircraft through ASPA is based on the results of subjective, periodic inspection. The second process, Programmed Depot Maintenance (PDM), is used by the U.S. Air Force. The Navy is also experimenting with its own form of PDM, called Phased Depot Maintenance. The PDM concept is based on the idea that regular overhaul of aircraft reduces man-hour requirements, turn-around time, and the variability of planning factors. The decision to induct an aircraft under PDM is entirely objective, as it is based solely on calendar time. A statistical comparison of the long term effects of ASPA and PDM is achieved by analyzing the output data of a simulation model designed in this thesis. Model output includes maintenance man-hour and turn-around time per depot overhaul, and the cumulative time in the depot and number of depot periods over the length of the simulation. The analysis provides insight into the benefits and trade-offs involved with each decision process.

### **COST-BENEFIT ANALYSIS OF NAVY MEMBERS BASED ON DEPENDENT STATUS**

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**B.S., Marquette University**

**Master of Science in Management-December 1995**

**Advisor: William R. Gates, Department of Systems Management**

This thesis determines whether there are differences in earnings and productivity of active duty members in the Navy, based on dependent status. Using data collected from Defense Manpower Data Center (DMDC), Bureau of Naval Medicine (BUMED), Military Traffic Management Office, and the Navy Budgeting Office, a cost basis of individuals with and without dependents was constructed to see if there was an appreciable difference in costs. Several studies and

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surveys were then evaluated to determine if there was a noticeable difference in productivity or benefits for the Navy based on dependent status. The findings revealed a difference in the cost to the Navy but found little or no added productivity. Furthermore, even though the difference in pay was relatively small, it had a large effect on the morale of individuals. Based on these findings, an alternative proposal for a more equitable compensation system was developed. This new system would help maintain the highest morale, simplify current procedures, create future savings for the Navy, and continue to provide the majority of benefits to the member. This solution would not affect retirement pay or the tax burden of individuals or the Navy.

### **AN ANALYSIS OF THE STANDARD DEPOT LEVEL MAINTENANCE (SDLM) PROGRAM OF THE F-14 TOMCAT**

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**Master of Science in Management-June 1996**

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Since 1991, the cost and schedule of the F-14 Tomcat Standard Depot Level Maintenance (SDLM) Program has doubled. Additionally, the requirements for In-Service Repair (ISR) have grown at a exponential rate as SDLM deferrals from the Aircraft Service Period Adjustment (ASPA) Program have caused the material condition of the aircraft to deteriorate and the need for depot-level field team rework to become increasingly demanded. As the cost of SDLM and ISR have grown, the number of aircraft overhauled each year has decreased. Recent efforts to decrease the scope of the SDLM Specification, or work breakdown, have not reduced this trend. The 1996 Preliminary SDLM Specification further reduces the depot's requirements placing more work into the hands of organizational level sailors, without compensating these units with additional manpower.

This cycle will continue and the cost for SDLM and the need for ISR will grow to the point where the aircraft will no longer be cost effective. In the meantime, our organizational units will continue to strive to maintain the aircraft to an acceptable level while additional workload is placed on them taking advantage of free sailor labor. This research shows that the present course will lead the aircraft to a cost effectiveness termination far short of the 2010 goal, while placing an undo burden on our organizational units.

### **CENTRALIZATION OR DECENTRALIZATION? A CASE STUDY OF THE MILITARY SEALIFT COMMAND'S SPECIAL MISSION PROGRAM**

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**Master of Science in Management-March 1996**

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**David G. Brown, Department of Systems Management**

This thesis asks the question: Should the Military Sealife Command's (MSC's) Special Mission Program be decentralized or kept centralized? The special mission ships support a combination of service unique non-transportation and non-fleet ship missions for a variety of sponsors. This thesis seeks to determine why the centralization/decentralization question is being asked by both MSC and the ships' sponsors. The thesis also examines whether the economies of scale and scope justify MSC maintaining the Special Mission Program, or if not, the ships would operate more efficiently and effectively under the cognizance of their sponsors. The analysis incorporates the current re-engineering changes being made within MSC. The findings suggest that the economies of scale and scope achieved from centralizing the special mission ships, with some additional modifications, are greater than the benefits which would be derived from decentralizing the ships' operations.

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### **SOFTWARE RISK MANAGEMENT: A CASE STUDY OF THE V-22 PROGRAM**

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**Master of Science in Management-March 1996**

**Advisor: Martin J. McCaffrey-Department of Systems Management**

Over the past thirty years, software development has become an increasingly important part of the technologically advanced weapon systems acquired by DoD. Program offices for software intensive weapon systems are facing the difficult task of managing software development risk. The purpose of this thesis is to identify and analyze software risk management techniques for their general application to software management problems during the acquisition process. This thesis focused on software risk management and risk management techniques used by the V-22 program office. Lessons learned which can be applicable to other programs are identified. The principal finding is that a formal, systematic, and disciplined risk management process, which includes software risk management, must be in place for software intensive weapon system acquisitions. Two primary recommendations are that the program manager create an environment where risks are freely communicated and that program executive officers assist program managers in the identification of software related development risks by conducting independent assessments.

### **AN ANALYSIS OF FACTORS AFFECTING PROMOTION, RETENTION, AND PERFORMANCE FOR USMC OFFICERS: A GRADUATE EDUCATION PERSPECTIVE**

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**Master of Science in Management-March 1996**

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**Julie Dougherty, Department of Systems Management**

This thesis analyzes the factors associated with promotion to O-4, retention to the O-4 promotion point, and actual performance ratings. One factor, graduate education, is specifically targeted for detailed analysis to determine its direct effects on the measures of on-the-job performance. A Defense Manpower Data Center (DMDC) cohort file of USMC officers who were commissioned during fiscal year 1980 is merged with Automated Fitness Report System (AFRS) files and Headquarters Master File (HMF) information to analyze performance differences between officers who have and have not obtained a postgraduate education. Nonparametric, ordinary least squares (OLS), and non-linear maximum likelihood (PROBIT) techniques are used to estimate the selection, retention and promotion models. The results suggest that actual on-the-job performance is an important factor in determining promotion, retention, and who attends graduate education. Graduate education appears to have a positive effect on promotion; however, failure to correct for retention and selection issues biases the estimated effects of graduate education upward. Further study using more sophisticated techniques is recommended to clarify the interrelationships among promotion, retention, performance, and graduate education and to gain more information on the magnitude and direction of these potential biases.

### **APPLICATION OF ATM TECHNOLOGY TO THE SYSTEMS MANAGEMENT DEPARTMENT COMPUTER LABORATORY NETWORK**

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**Master of Science in Information Technology Management-March 1996**

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Since the appearance of Local Area Networks (LANs), their use and bandwidth consumption have increased considerably. Users are now seeking new technologies to satisfy their bandwidth demand. Many consider ATM the solution to their needs. Though ATM is a fairly new networking technology, it has made several strides, and is now considered a viable technology that is applicable in a LAN environment. However, migrating from today's shared-medium LANs (Token-Ring and Ethernet) to an ATM LAN exposes an organization to difficulties, risks and costs. A well thought-out

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migration strategy reduces the impact of these factors while implementing ATM technology.

This study reviews ATM technology and its application in a LAN environment, evaluates the Systems Management Department Computer Lab LAN, redesigns the LAN using ATM technology, and develops an evolutionary strategy to implement the proposed ATM LAN.

### **ORBITAL DEBRIS: COST IMPACT ON SETTING POLICY**

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**Master of Science in Systems Technology-June 1996**

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**Carl R. Jones, Department of Systems Management**

As the exploration of space increases, the problems associated with orbital debris also increase. Orbital debris continues to grow at a linear rate with an ever increasing possibility of a shift to an exponential rate. If this point is achieved, space travel will, at best, be extremely hazardous and at worst, unusable. When mitigating orbital debris, cost and policy issues must be addressed. Currently, no policy exists that makes the mitigation of orbital debris mandatory but it only strongly recommends mitigation if it is cost effective. This thesis addresses the cost impact of alternative spacecraft design options for orbital debris mitigation. The cost impact is shown by developing generic satellite characteristics, considering two different altitudes, and using alternative design options.

### **CAUSE AND ANALYSIS OF COST OF LIVING ALLOWANCE**

**FLUCTUATION IN YOKOSUKA, JAPAN**

**William P. Wood-Lieutenant, United States Navy**

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**O. Douglas Moses, Department of Systems Management**

In June 1995, an unexpected decrease in COLA index on the Kanto Plain of Japan, to include the Yokosuka area, caused concern amongst service members stationed in this area. The purchasing power of the dollar was in decline when compared to the yen and all other economic indicators at the time of the COLA decrease suggested that the COLA index should have increased or at least remained constant. What explains the apparent inconsistency between the declining value of the dollar relative to the yen and the concurrent decrease in COLA provided to service members? This thesis conducted a critical analysis of the procedures and methods used by the Per Diem, Travel and Transportation Allowance Committee (PDTATAC) to calculate the cost of living allowance (COLA) index and determine the cause and effect of the June 1995 decrease in COLA index. This thesis addressed the policies of the COLA system, utilizing both historical data and a stylized model, to determine if they are equitable from an economic standpoint. The analysis revealed that the Living Pattern Survey (LPS) was a viable tool to obtain information on where service members made purchases, if exchange rates were stable. If exchange rates were increasing, the LPS prevented overpayment of service members. If exchange rates were declining, the LPS reduced the "purchasing power" of service members.

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### VALIDATING AND IMPROVING EXISTING JLOTS THROUGHPUT MODELS WITH THE USE OF HISTORICAL WEATHER DATA

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**Master of Science in Operations Research-September 1996**

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**Second Reader: David A. Schrady, Department of Operations Research**

The practice of Joint Logistics Over the Shore (JLOTS), whereby strategic sealift assets are off-loaded without the benefit of fixed port facilities has emerged as one viable technique which could alleviate certain situational sustainment problems. The ability to successfully conduct JLOTS operations, however, is presently limited by several factors, the most significant of which is the dependency of JLOTS operations upon favorable wind, weather, and sea state conditions. Presently, the few analytical JLOTS throughput models in existence have very limited incorporation of environmental parameters.

With this in mind, this thesis attempts to both validate and improve the most widely acclaimed JLOTS throughput model, the Joint Over the shore Transportation Estimator (JOTE) developed by the Logistics Management Institute (LMI). The validation centers upon identifying the demands placed upon the user when employing JOTE as well as assessing the validity of its computational methodology. As a means of improving JOTE and rendering it more viable as a planning tool, this thesis introduces a supplement entitled the SEA-STATE-CALC package which facilitates both site and time specificity in the most crucial input parameters to the JOTE model. By helping to identify time periods in which sea state conditions threaten JLOTS operations, the SEA-STATE-CALC package services the planning needs of its true client, the JLOTS commander.

### THE BANK CARD PROGRAM: A CASE STUDY

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**Master of Science in Management-December 1995**

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The focus of this thesis is to review the use of the Government-wide commercial bank card known as the International Merchant Purchase Agreement Card (I.M.P.A.C.) at the Naval Air Warfare Center, Weapons Division (NAWCWPNS), China Lake, CA. The intent of the study is to analyze the bank card program. It will identify the basic procedures involved in using the bank card, and will evaluate how China Lake cardholders feel the card has affected their small purchase performance. A survey was developed to assess the bank card program. Cardholders were the respondents of the survey. Bank card data were reviewed from the General Services Administration to determine the status of the program. The conclusions of this research are that the bank card program at NAWCWPNS has been extremely effective. Recommendations include selecting NAWCWPNS as a site for bank card experiments and/or policy and procedural changes to the program. NAWCWPNS can also initiate a DoD council to continue to improve and promote the use of the bank card as a vehicle to support the recommendations of the National Performance Review (NPR) regarding small purchases.

### RESTRUCTURING THE BUDGET FOR THE FLEET MODERNIZATION PROGRAM (FMP)

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**Master of Science in Management-June 1996**

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**John E. Mutty, Department of Systems Management**

The Fleet Modernization Program (FMP) provides a systematic structure for planning, programming, budgeting, and installing improvements to ships of the active and reserve fleets. The procedures for budgeting and executing the FMP

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are governed by the rules of the current FMP Fiscal Appropriation. Since Fiscal Year (FY) 1989, a series of FMP appropriation decisions has resulted in each budget year program being budgeted and executed differently. These decisions have directly affected fleet modernization efforts and have increased the complexity of the FMP, a program which is well known for its fragmented infrastructure and misunderstood procedures. This thesis analyzes the budget structure of the FMP and evaluates the impact of changes in the budget structure since FY 1989, primarily as they relate to program execution. The research compares and contrasts funding and procedural differences between the FMP and the TRIDENT modernization program. The final results of this analysis are specific recommendations on how to restructure the FMP budget to improve program execution. Additionally, this research serves as a historical record of the FMP budget structure changes since FY 1989.

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